

| <b>Advanced Computer Architecture and Organization</b> |   |  |   |                                       |                               |
|--|---|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61201                         | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 3               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>   | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>   | <b>Prerequisites for participation</b><br>already taken Computer Architecture and Organization course   |  |   |                                       |                               |
| <b>3</b>   | <b>Learning outcomes</b><br>Students are able to design the ALU on the computer processor (CPU).<br>Students are able to design the existing datapath on the computer.<br>Students are able to design the Control Unit (CU) on the computer.<br>Students are able to design microcodes according to the type of Instruction Set Architecture (ISA) on the computer, both RISC and CISC.<br>Students are able to diagnose the computer they have designed through the debugging process.<br>Students are able to explain ISA on a computer.<br>Students are able to explain the compiler on the computer.<br>Students are able to explain the input-output of a computer.<br>Students are able to explain cache memory.<br>Students are able to explain process state and memory management.<br>Students are able to explain the pipeline on the computer. |  |   |                                       |                               |
| <b>4</b>   | <b>Subject aims</b><br>This course discusses the continuation of Computer Architecture and Organization in terms of design and in-depth analysis of how the CPU, memory and input-output work   |  |   |                                       |                               |
| <b>5</b>   | <b>Teaching methods</b><br>lectures   |  |   |                                       |                               |
| <b>6</b>   | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |  |   |                                       |                               |
| <b>7</b>   | <b>This module is used in the following degree programs as well</b>   |  |   |                                       |                               |

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|   | Sarjana Teknik (Bachelor of Engineering)                           |
| 8 | <b>Responsibility for module</b><br>Rakhmadhany Primananda, M.Kom. |
| 9 | <b>Other information</b><br>none                                   |

| <b>Computer System and Networking Analysis</b> |   |                                     |  |                                  |                        |
|--|---|-------------------------------------|--|----------------------------------|------------------------|
| module code<br>CCE62205                        | student workload<br>181.00 hours  | credits<br>(according to ECTS)<br>6 | semester<br>Sem. 2                       | frequency<br>each even-semester  | duration<br>1 semester |
| 1  | <b>Types of courses</b><br>class  | <b>contact hours</b><br>53.00 hours | <b>independent study</b><br>128.00 hours | <b>class size</b><br>45 students |                        |
| 2  | <b>Prerequisites for participation</b><br>none  |                                     |  |                                  |                        |
| 3  | <b>Learning outcomes</b><br>Students are able to understand and calculate the concepts of calculus of functions, limits, derivatives and integrals.<br><br>Students are able to understand and calculate linear algebra concepts including matrices, vectors, systems of linear equations and linear transformations. |                                     |  |                                  |                        |
| 4  | <b>Subject aims</b><br>The course discusses calculus and linear algebra in relation to computer science learning  |                                     |  |                                  |                        |
| 5  | <b>Teaching methods</b><br>lectures, discussion   |                                     |  |                                  |                        |
| 6  | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |                                     |  |                                  |                        |
| 7  | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |                                     |  |                                  |                        |
| 8  | <b>Responsibility for module</b><br>Achmad Ridok, Dr.   |                                     |  |                                  |                        |

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| 9 | <b>Other information</b><br>none |
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| <b>Advanced Programming</b> |  |                                     |   |                                  |            |
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| module code                 | student workload   | credits<br>(according to ECTS)      | semester                                | frequency                        | duration   |
| CCE61207                    | 181.33 hours   | 6                                   | Sem. 2                                  | each even-semester               | 1 semester |
| 1                           | <b>Types of courses</b><br>class   | <b>contact hours</b><br>85.33 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                           | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                           | <b>Learning outcomes</b><br><p>Students are able to explain the basic concepts of Python programming.</p> <p>Students are able to apply structured programming using condition selection and loops.</p> <p>Students are able to apply text and string manipulation, use lists, tuples and dictionaries, searching, sorting.</p> <p>Students are able to design and implement the use of functions and recursion.</p> <p>Students are able to apply OOP programming and classroom concepts.</p> <p>Students are able to implement GUI using Python.</p> <p>Students are able to apply multithreading and client/server programming.</p> |                                     |   |                                  |            |
| 4                           | <b>Subject aims</b><br><p>This course discusses the application of Python programming starting from the IDE, syntax, data types, conditions, functions, to the concept of OOP, multithreading, GUI and Event Driven Programming.</p>   |                                     |   |                                  |            |
| 5                           | <b>Teaching methods</b><br>lectures, discussion  |                                     |   |                                  |            |
| 6                           | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |                                     |   |                                  |            |
| 7                           | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |                                     |   |                                  |            |

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| 8 | <b>Responsibility for module</b><br>Mochammad Hannast Hanafi Ichsan, M.T. |
| 9 | <b>Other information</b><br>none  |

| <b>Aerial Robotics</b> |  |                                     |   |                                  |            |
|------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code            | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60203               | 136.00 hours   | 4.5                                 | Sem. 6 or 8                             | each even-semester               | 1 semester |
| 1                      | <b>Types of courses</b><br>class, project-base   | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                      | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                      | <b>Learning outcomes</b><br>Students are able to explain the components of aerial robotics systems.<br>Students are able to explain the movement mechanism of the quadcopter.<br>Students are able to calculate robot positioning techniques.<br>Students are able to explain mapping techniques.<br>Students are able to explain the control system on a quadcopter.<br>Students are able to explain navigation and planning.<br>Students are able to demonstrate the quadcopter in the simulation. |                                     |   |                                  |            |
| 4                      | <b>Subject aims</b><br>This course discusses UAV/quadcopter drones ranging from components, movement and navigation, location determination, mapping, and control.   |                                     |   |                                  |            |
| 5                      | <b>Teaching methods</b><br>lectures, discussion, presentation  |                                     |   |                                  |            |
| 6                      | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, project evaluation  |                                     |   |                                  |            |
| 7                      | <b>This module is used in the following degree programs as well</b>  |                                     |   |                                  |            |

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|   | Sarjana Teknik (Bachelor of Engineering)                |
| 8 | <b>Responsibility for module</b><br>Eko Setiawan, Ph.D. |
| 9 | <b>Other information</b><br>none                        |

| <b>Algorithm Design and Analysis</b> |   |                                       |   |                                  |                        |
|--------------------------------------|---|---------------------------------------|---|----------------------------------|------------------------|
| module code<br>CCE62203              | student workload<br>136.00 hours  | credits<br>(according to ECTS)<br>4.5 | semester<br>Sem. 4                      | frequency<br>each even-semester  | duration<br>1 semester |
| 1                                    | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                        |
| 2                                    | <b>Prerequisites for participation</b><br>none  |                                       |   |                                  |                        |
| 3                                    | <b>Learning outcomes</b><br><p>Able to understand design concepts and algorithmic analysis in solving broad problems and able to study various examples of algorithms and their application</p> <p>Able to design, and perform analytical calculations, to determine the correctness and accuracy of several algorithms including non-recursive algorithms, order of growth, asymptotic notation, recursive algorithms, brute force, greedy, divide &amp; conquer, decrease &amp; conquer dynamic programming, and backtracking algorithms, to relevant cases in various fields and multi-disciplines.</p> <p>Able to apply design concepts and algorithmic analysis in the form of program code.</p>       |                                       |   |                                  |                        |
| 4                                    | <b>Subject aims</b><br><p>Algorithm Design and Analysis is a compulsory subject that provides knowledge of descriptions of various kinds of algorithms from basic to advanced based on the characteristics of the case study, with various techniques commonly used to design and analyze algorithms broadly, both simple and very complex. Then it can also be used to identify the validity of an algorithm in certain cases, as well as compare several algorithms and be able to determine which algorithm is the best to solve a problem efficiently and effectively before it is implemented, as well as provide the ability to analyze the algorithm in the implementation of computer programs.</p> |                                       |   |                                  |                        |
| 5                                    | <b>Teaching methods</b>   |                                       |   |                                  |                        |

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|   | lectures  |
| 6 | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination                    |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Achmad Ridok, Dr.   |
| 9 | <b>Other information</b><br>none  |

| <b>Applied Database</b> |  |                                     |   |                                  |            |
|-------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code             | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE62202                | 136.00 hours   | 4.5                                 | Sem. 2                                  | each even-semester               | 1 semester |
| 1                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                       | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                       | <b>Learning outcomes</b><br>Students are able to apply principles to database devices<br>Students are able to master the concepts of architecture to the working principles of databases<br>Students are able to study scientifically about formulation and problem solving systems using database techniques and devices independently and measurably<br>Students are able to study engineering, maintenance, and database system development |                                     |   |                                  |            |
| 4                       | <b>Subject aims</b><br>This course discusses the concept of databases, relational models as well as designing and handling operations on databases, so that students are able to understand concepts, perform designs and can handle operations involving databases. In the concept and design section, students are expected to be able to categorize data models and design relational models that are                                       |                                     |   |                                  |            |

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|   | used to design data storage forms in normal form. In the operation, students are expected to be able to perform queries to manipulate data. |
| 5 | <b>Teaching methods</b><br>lectures, discussion   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)                             |
| 8 | <b>Responsibility for module</b><br>Achmad Arwan, M.Kom.  |
| 9 | <b>Other information</b><br>none  |

| <b>Basic Programming</b> |  |                                     |   |                                  |            |
|--------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code              | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| COM60014                 | 181.33 hours   | 6                                   | Sem. 1                                  | each odd-semester                | 1 semester |
| 1                        | <b>Types of courses</b><br>class   | <b>contact hours</b><br>85.33 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                        | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                        | <b>Learning outcomes</b><br>Students are able to understand, abstract, and identify simple computational problems into a structured programming approach<br>Students are able to develop algorithms in the form of flowcharts and/or pseudocode with a structured programming approach to solve simple computational problems<br>Able to make computer programs with a structured programming approach for simple computing problems using programming languages |                                     |   |                                  |            |
| 4                        | <b>Subject aims</b>  |                                     |   |                                  |            |

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|   | Basic Programming is a subject that must be mastered by students of the Faculty of Computer Science. This Basic Programming provides knowledge about algorithms and structured programming and applies them to programming languages in simple computing problems. This course is the foundation and prerequisite for courses in the following semester. |
| 5 | <b>Teaching methods</b><br>lectures, discussion  |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |
| 8 | <b>Responsibility for module</b><br>Sutrisno, M.T.   |
| 9 | <b>Other information</b><br>none   |

| <b>Capita Selecta</b> |  |                                     |   |                                  |            |
|-----------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code           | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60211              | 90.67 hours  | 3                                   | Sem. 6; Sem. 8                          | each even-semester               | 1 semester |
| 1                     | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |
| 2                     | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                     | <b>Learning outcomes</b><br>Students are able to explain a broad overview of computer engineering.<br>Students are able to explain the latest computer engineering applications in the industrial field.<br>Students are able to explain the latest computer engineering applications in the field of agriculture.<br>Students are able to explain the latest computer engineering applications in the health sector.<br>Students are able to explain the latest computer engineering applications in the home automation field. |                                     |   |                                  |            |



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|   | Students are able to explain the latest computer engineering applications in the field of science.<br>Students are able to explain the latest developments and technology in Computer Engineering.. |
| 4 | <b>Subject aims</b><br>This course discusses the application of computer engineering in various fields  |
| 5 | <b>Teaching methods</b><br>lectures, discussion   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |
| 8 | <b>Responsibility for module</b><br>Agung Setia Budi, Ph.D.   |
| 9 | <b>Other information</b><br>none  |

| <b>Citizenship</b> |   |                                     |   |                                  |            |
|--------------------|---|-------------------------------------|---|----------------------------------|------------|
| module code        | student workload  | credits<br>(according to ECTS)      | semester                                | frequency                        | duration   |
| MPK60006           | 90.67 hours   | 3                                   | Sem. 3                                  | each odd-semester                | 1 semester |
| 1                  | <b>Types of courses</b><br>class  | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |
| 2                  | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |            |
| 3                  | <b>Learning outcomes</b><br>Students are able to understand the nature of civic education in the development of full-fledged undergraduate or professional abilities and link the values of Pancasila with the subject matter in the Citizenship Education course.<br><br>Students are able to interpret the concept of the Unitary State of the Republic of Indonesia and identify and recognize the uniqueness of the Indonesian legal state which is based on the values of Pancasila. |                                     |   |                                  |            |

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|   | <p>Students are able to understand the supremacy of the constitution and the peculiarities of the 1945 Constitution of the Republic of Indonesia which is based on the values of Pancasila and to sort out constitutional and unconstitutional behavior in the life of the nation and state.</p> <p>Students are able to understand, identify, and defend national identity from popular culture in the current of globalization.</p> <p>Students are able to build awareness and believe in the importance of involvement or participation in the practice of Pancasila democracy.</p> <p>Students are able to examine Pancasila as the philosophical foundation of Human Rights in the State of Indonesia and compromise between human rights and obligations in the life of the nation and state.</p> <p>Students are able to understand the concepts of geopolitics and geopolitics in Indonesia as well as classify the potential for diversity of natural resources and human resources in the concept of regional autonomy based on the Archipelago Insight.</p> <p>Students are able to show a sense of love for the homeland, have nationalism, and have a sense of responsibility to the country and nation.</p> |
| 4 | <p><b>Subject aims</b></p> <p>Citizenship course is a compulsory national course included in the Personality Development Course (MPK) of Universitas Brawijaya which functions as student orientation in strengthening the insight and spirit of nationalism, love for the homeland, democracy, legal awareness, respect for diversity, and participation in building the nation and state based on Pancasila, with a weight of 2 credits.</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Rizki Agung Novariyanto, M.Pd.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Computer System and Networking Analysis</b> |  |  |   |                                       |                               |
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| <b>module code</b><br>COM60015                 | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 1               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                                       | <b>Prerequisites for participation</b><br>none   |  |   |                                       |                               |
| <b>3</b>                                       | <b>Learning outcomes</b><br>Students are able to explain discrete concepts in the field of computer science<br>Students are able to apply logical inference<br>Students are able to apply the concepts of sets, relations and functions<br>Students are able to apply the concepts of series, sequence and induction<br>Students are able to apply the concepts of counting, discrete probability, and number theory<br>Students are able to apply the concept of recurrence<br>Students are able to understand matrices and vectors                       |  |   |                                       |                               |
| <b>4</b>                                       | <b>Subject aims</b><br>This course is a compulsory subject with no prerequisites that must be completed first by students. The material for this course provides an understanding of discrete concepts, logical inference concepts, sets, relations and functions, series and sequences, mathematical induction, enumeration, discrete probability, number theory, recurrence, matrices, and vectors. Lectures are carried out with lectures, discussions, and structured assignments as the application of the theory that has been obtained in lectures. |  |   |                                       |                               |
| <b>5</b>                                       | <b>Teaching methods</b><br>lectures, discussion  |  |   |                                       |                               |
| <b>6</b>                                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |                                       |                               |
| <b>7</b>                                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |  |   |                                       |                               |
| <b>8</b>                                       | <b>Responsibility for module</b><br>Edy Santoso, M.Kom.  |  |   |                                       |                               |

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| 9 | <b>Other information</b><br>none |
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| <b>Computer Architecture and Organization</b> |   |                                     |   |                                  |            |
|---|---|-------------------------------------|---|----------------------------------|------------|
| module code                                   | student workload  | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| COM60011                                      | 136.00 hours  | 4.5                                 | Sem. 2                                  | each even-semester               | 1 semester |
| 1   | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2   | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |            |
| 3   | <b>Learning outcomes</b><br><p>Students are able to describe the history of the development of computer evolution.</p> <p>Students are able to describe the architecture and organization of the processor (CPU) on a computer.</p> <p>Students are able to describe the architecture and organization of memory on a computer.</p> <p>Students are able to describe the interface of input-output (IO) and other peripherals that exist or are connected to a computer.</p> <p>Students are able to describe the components of a digital system for those on a computer.</p> <p>Students are able to describe logical and arithmetic operations performed by computers.</p> <p>Students are able to describe the Instruction Set Architecture (ISA) that exists and is used on computers.</p> <p>Students are able to describe the existing multicore architecture on computers.</p> <p>Students are able to describe the architecture of distributed systems used on computers.</p> |                                     |   |                                  |            |
| 4   | <b>Subject aims</b><br><p>This course discusses Computer Architecture and Organization consisting of Processors, Memory, Input-output, and Instruction Set Architecture (ISA) and discusses the latest computer developments related to multicore and Distributed Computer Systems.</p>   |                                     |   |                                  |            |
| 5   | <b>Teaching methods</b><br>lectures   |                                     |   |                                  |            |

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| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer) |
| 8 | <b>Responsibility for module</b><br>Mochammad Hannast Hanafi Ichsan, M.T.  |
| 9 | <b>Other information</b><br>none   |

| <b>Computer Network Administration</b> |  |                                       |   |                                  |                 |
|--|--|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>                     | <b>student workload</b>  | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE60201                               | 136.00 hours   | 4.5                                   | Sem. 5 or 7                             | each odd-semester                | 1 semester      |
| 1                                      | <b>Types of courses</b><br>class, case-based   | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| 2                                      | <b>Prerequisites for participation</b><br>have already taken a Computer Networking course  |                                       |   |                                  |                 |
| 3                                      | <b>Learning outcomes</b><br>Students are able to explain the general routing description on the network<br>Students are able to explain several routing algorithms and protocols<br>Students are able to explain flow models on the network<br>Students are able to explain IP routing and several distance-vector routing protocols<br>Students are able to explain network traffic engineering<br>Students are able to explain router architecture<br>Students are able to explain queuing and packet scheduling<br>Students are able to explain traffic conditioning<br>Students are able to apply routing mechanisms and network service quality using a simulator |                                       |   |                                  |                 |
| 4                                      | <b>Subject aims</b>  |                                       |   |                                  |                 |

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|   | This course discusses several routing protocols on the Internet and their traffic engineering mechanisms and service quality. |
| 5 | <b>Teaching methods</b><br>lectures, discussion   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, participation evaluation                 |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)               |
| 8 | <b>Responsibility for module</b><br>Reza Andria Siregar, M.Kom.   |
| 9 | <b>Other information</b><br>none  |

| <b>Computer Networking</b> |  |                                       |   |                                  |                 |
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| <b>module code</b>         | <b>student workload</b>  | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE61203                   | 181.33 hours   | 6                                     | Sem. 5                                  | each odd-semester                | 1 semester      |
| 1                          | <b>Types of courses</b><br>class, practicum  | <b>contact hours</b><br>85.33 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| 2                          | <b>Prerequisites for participation</b><br>none   |                                       |   |                                  |                 |
| 3                          | <b>Learning outcomes</b><br>Students are able to explain how computer networks work.<br>Students are able to explain the concepts and workings of the application layer on the internet.<br>Students are able to explain the concepts and workings of the transport layer on the internet.<br>Students are able to explain the concepts and workings of the network layer on the internet.<br>Students are able to explain the concept and how the link-layer works on the internet. |                                       |   |                                  |                 |
| 4                          | <b>Subject aims</b>  |                                       |   |                                  |                 |

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|   | This course discusses the concepts and workings of computer networks using a layered approach. The division of layers is based on the standard Internet Protocol Stack, starting from the Application, Transport, Network layer to the Data Link layer. |
| 5 | <b>Teaching methods</b><br>lectures, practical works  |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, practical-skill evaluation   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer)  |
| 8 | <b>Responsibility for module</b><br>Fariz Andri Bakhtiar, M.Kom.  |
| 9 | <b>Other information</b><br>none  |

| <b>Computer Security</b> |  |                                     |   |                                  |            |
|--------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code              | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE61204                 | 136.00 hours   | 4.5                                 | Sem. 5                                  | each odd-semester                | 1 semester |
| 1                        | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                        | <b>Prerequisites for participation</b><br>Linear System  |                                     |   |                                  |            |
| 3                        | <b>Learning outcomes</b><br>Students are able to explain the basic concepts of computer security.<br>Students are able to explain the types of system security vulnerabilities.<br>Students are able to explain the concept of CIA security (Confidentiality, Integrity, Availability).<br>Students are able to apply classical security algorithms.<br>Students are able to apply encryption algorithms.<br>Students are able to apply asymmetric key algorithms. |                                     |   |                                  |            |

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|   | <p>Students are able to solve problems in case studies that have been taught in previous chapters.</p> <p>Students are able to apply block cipher algorithms.</p> <p>Students are able to explain the concepts of data integrity and authentication.</p> <p>Students are able to apply data integrity algorithms.</p> <p>Students are able to apply authentication algorithms.</p> <p>Students are able to explain the Law on Information and Electronic Transactions (UU ITE).</p> <p>Students are able to complete a final project on a case study.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses computer security, types of system security vulnerabilities, security concepts and various algorithms related to computer security</p>  |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Fariz Andri Bakhtiar, M.Kom.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Computer System and Networking Analysis</b> |  |  |   |                                       |                               |
|--|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE60204                 | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 5 or 7          | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                                       | <b>Prerequisites for participation</b><br>have already taken Statistics course |  |   |                                       |                               |



|   |  |
|---|--|
| 3 | <p><b>Learning outcomes</b></p> <p>Students are able to explain the introduction to performance evaluation.</p> <p>Students are able to explain the discussion of performance evaluation.</p> <p>Students are able to explain the types of workloads.</p> <p>Students are able to explain workload characterization techniques.</p> <p>Students are able to solve problems from M1 – M4.</p> <p>Students are able to explain capacity planning and benchmarking.</p> <p>Students are able to explain data representation.</p> <p>Students are able to apply ratio games in detail.</p> <p>Students are able to analyze the system with sample data.</p> <p>Students are able to build models with linear regression.</p> <p>Students are able to solve problems from M8 – M10.</p> <p>Students are able to analyze queuing theory.</p> <p>Students are able to analyze the performance of web services.</p> <p>Students are able to analyze system comparisons or model development.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course provides an overview of computer system performance analysis</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Rakhmadhany Primananda, M.Kom.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Computer System Engineering</b> |  |  |   |                                       |                               |
|------------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61209     | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 5               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                           | <b>Types of courses</b><br>class, project-based  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                           | <b>Prerequisites for participation</b><br>have already taken 60 credits (90 ECTS)  |  |   |                                       |                               |
| <b>3</b>                           | <b>Learning outcomes</b><br>Students are able to explain the concept of the Socio-Technical System.<br>Students are able to explain the concept of Critical Systems.<br>Students are able to express Hardware and software Processes.<br>Students are able to design Requirements Analysis.<br>Students are able to describe the Feasibility of System Architecture. |  |   |                                       |                               |
| <b>4</b>                           | <b>Subject aims</b><br>This course discusses the concepts and processes of computer systems engineering  |  |   |                                       |                               |
| <b>5</b>                           | <b>Teaching methods</b><br>lectures, discussion, presentation  |  |   |                                       |                               |
| <b>6</b>                           | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |                                       |                               |
| <b>7</b>                           | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |  |   |                                       |                               |
| <b>8</b>                           | <b>Responsibility for module</b><br>Eko Setiawan, Ph.D.  |  |   |                                       |                               |
| <b>9</b>                           | <b>Other information</b><br>none   |  |   |                                       |                               |

| <b>Computer-based Medical System</b> |   |  |   |  |                               |
|--------------------------------------|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60224       | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 6 or 8          | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                             | <b>Types of courses</b><br>class, case-study  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                             | <b>Prerequisites for participation</b><br>none  |  |   |  |                               |
| <b>3</b>                             | <b>Learning outcomes</b><br><p>Students are able to explain the basic concepts of medical instrumentation.</p> <p>Students are able to explain bio signals, bioelectric signals, and biopotentials that exist in the human body.</p> <p>Students are able to explain the technique of recording electrical activity in the human body using electrodes.</p> <p>Students are able to explain the technique of recording changes in blood volume in microvascular tissue using optical sensors.</p> <p>Students are able to apply initial processing to bio signals.</p> <p>Students are able to analyse bio signals using a computer-based system.</p> |  |   |  |                               |
| <b>4</b>                             | <b>Subject aims</b><br>This course discusses bio signals and their acquisition techniques, as well as how to process them using a computer-based system   |  |   |  |                               |
| <b>5</b>                             | <b>Teaching methods</b><br>lectures, discussion   |  |   |  |                               |
| <b>6</b>                             | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination, active-learning assessment  |  |   |  |                               |
| <b>7</b>                             | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |  |                               |
| <b>8</b>                             | <b>Responsibility for module</b><br>Rizal Maulana, M.Sc.  |  |   |  |                               |
| <b>9</b>                             | <b>Other information</b><br>none  |  |   |  |                               |

| <b>Control System</b>          |   |  |   |  |                               |
|--------------------------------|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60222 | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 6; Sem<br>8     | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none  |  |   |  |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain the definition and function of control systems.<br>Students are able to explain the stages of the control system.<br>Students are able to calculate the mathematical model of a system.<br>Students are able to use control systems to solve simple problems.<br>Students are able to demonstrate the application of control systems in simulation software.<br>Students are able to explain the working principle of PID control. |  |   |  |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses the concept and application of control systems to solve simple problems using computer-based systems.  |  |   |  |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, discussion   |  |   |  |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |  |   |  |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |  |                               |
| <b>8</b>                       | <b>Responsibility for module</b><br>Eko Setiawan, Ph.D.   |  |   |  |                               |
| <b>9</b>                       | <b>Other information</b><br>none  |  |   |  |                               |

| <b>Data Communication</b>      |  |  |   |                                       |                               |
|--------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61205 | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 3               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none   |  |   |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain the concept of data transmission.<br>Students are able to explain the types of transmission media.<br>Students are able to explain various data encoding techniques.<br>Students are able to explain the types of noise and errors in transmission media.<br>Students are able to explain various kinds of data communication interfaces.<br>Students are able to explain the concept of Data Link Control Protocol.<br>Students are able to explain multiplexing and spread spectrum techniques.<br>Students are able to explain the types of multiple access techniques on transmission media.<br>Students are able to explain several kinds of wireless communication technology.<br>Students are able to explain several kinds of process automation communication protocols. |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course provides knowledge related to the concept of data transmission contained in computer systems. Several techniques and protocols used in transmitting data will be discussed in detail in this course.  |  |   |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures  |  |   |                                       |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |                                       |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b>  |  |   |                                       |                               |

|   |   |
|---|---|
|   | Sarjana Teknik (Bachelor of Engineering)                        |
| 8 | <b>Responsibility for module</b><br>Reza Andria Siregar, M.Kom. |
| 9 | <b>Other information</b><br>none                                |

| <b>Data Flow Programming</b> |   |                                       |   |                                  |                        |
|------------------------------|---|---------------------------------------|---|----------------------------------|------------------------|
| module code<br>CCE60206      | student workload<br>136.00 hours  | credits<br>(according to ECTS)<br>4.5 | semester<br>Sem. 6; Sem. 8              | frequency<br>each even-semester  | duration<br>1 semester |
| 1                            | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                        |
| 2                            | <b>Prerequisites for participation</b><br>Basic Programming   |                                       |   |                                  |                        |
| 3                            | <b>Learning outcomes</b><br>Students are able to explain the Dataflow Programming paradigm and its Environment.<br>Students are able to apply for structured data and programs with Dataflow Programming.<br>Students are able to implement access to computer resources using Dataflow Programming.<br>Students are able to apply User Interface and Input-Output with Dataflow Programming.<br>Students are able to build distributed applications with Dataflow Programming. |                                       |   |                                  |                        |
| 4                            | <b>Subject aims</b><br>This course discusses the new paradigm in programming using the concept of data flow.  |                                       |   |                                  |                        |
| 5                            | <b>Teaching methods</b><br>lectures, discussion   |                                       |   |                                  |                        |
| 6                            | <b>Assessment methods</b><br>project assignment, mid-term examination, end-term examination   |                                       |   |                                  |                        |
| 7                            | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |                                       |   |                                  |                        |
| 8                            | <b>Responsibility for module</b>  |                                       |   |                                  |                        |

|   |                                       |
|---|---------------------------------------|
|   | Mochammad Hannast Hanafi Ichsan, M.T. |
| 9 | <b>Other information</b><br>none      |

| <b>Data Structure and Algorithm</b> |   |  |   |  |                               |
|-------------------------------------|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE62201      | <b>student workload</b><br>181.33 hours   | <b>credits</b><br>(according to ECTS)<br>6 | <b>semester</b><br>Sem. 2               | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| 1                                   | <b>Types of courses</b><br>class, practicum   | <b>contact hours</b><br>85.00 hours        | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| 2                                   | <b>Prerequisites for participation</b><br>none  |  |   |  |                               |
| 3                                   | <b>Learning outcomes</b><br>Able to understand the basic concepts of abstract data type (ADT) in data structures<br>Able to abstract, identify and apply linear and/or non-linear data structures to solve computational problems<br>Able to understand and apply data search algorithms<br>Able to understand and apply data sorting algorithm<br>Able to understand and apply hashing algorithm   |  |   |  |                               |
| 4                                   | <b>Subject aims</b><br>This course will provide an understanding of how to determine and implement appropriate data structures and algorithms to solve a particular problem by paying attention to efficiency and effectiveness. Algorithm is used as an approach to be able to compose and manage instructions efficiently. Data structures are used to manage data effectively. This lecture is carried out by providing material, assignments and discussions in class and practicum |  |   |  |                               |
| 5                                   | <b>Teaching methods</b><br>lectures, practical works  |  |   |  |                               |
| 6                                   | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination, practical work assessment   |  |   |  |                               |
| 7                                   | <b>This module is used in the following degree programs as well</b>   |  |   |  |                               |

|   |  |
|---|--|
|   | Sarjana Teknik (Bachelor of Engineering)           |
| 8 | <b>Responsibility for module</b><br>Sutrisno, M.T. |
| 9 | <b>Other information</b><br>none                   |

| <b>Digital Image Computation</b> |   |                                     |   |                                  |            |
|----------------------------------|---|-------------------------------------|---|----------------------------------|------------|
| module code                      | student workload  | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60213                         | 136.00 hours  | 4.5                                 | Sem. 6; Sem 8                           | each even-semester               | 1 semester |
| 1                                | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                                | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |            |
| 3                                | <b>Learning outcomes</b><br>Students are able to explain about digital images and the application of digital images in everyday life.<br>Students are able to explain various digital image formats.<br>Students are able to explain various color spaces and the implementation of the use of color spaces in digital image processing.<br>Students are able to explain the scaling methods used in digital image processing.<br>Students are able to explain the process of digital image segmentation.<br>Students are able to explain and perform digital image processing in the frequency domain.<br>Students are able to explain morphological operations in Image Processing.<br>Students are able to explain various filters and their applications in digital image processing. |                                     |   |                                  |            |
| 4                                | <b>Subject aims</b><br>This course discusses various techniques for applying digital image computing.   |                                     |   |                                  |            |
| 5                                | <b>Teaching methods</b><br>lectures, discussion   |                                     |   |                                  |            |



|   |   |
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| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination                             |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Fitri Utaminingrum, Dr.Eng.   |
| 9 | <b>Other information</b><br>none  |

| <b>Digital System</b> |   |                                       |   |                                  |                 |
|-----------------------|---|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>    | <b>student workload</b>   | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE61210              | 181.33 hours  | 6                                     | Sem. 1                                  | each odd-semester                | 1 semester      |
| 1                     | <b>Types of courses</b><br>class, practicum   | <b>contact hours</b><br>85.33 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| 2                     | <b>Prerequisites for participation</b><br>none  |                                       |   |                                  |                 |
| 3                     | <b>Learning outcomes</b><br>Students are able to process the binary number system.<br>Students are able to design a digital system consisting of several basic logic gates.<br>Students are able to design a digital system consisting of a combinational circuit.<br>Students are able to design a digital system consisting of a sequential circuit.<br>Students are able to design a digital system that utilizes a Programmable Logic Device (PLD).<br>Students are able to design a simple digital system to solve a concrete problem. |                                       |   |                                  |                 |
| 4                     | <b>Subject aims</b><br>This course provides a basic understanding of the basic concepts and implementations of digital systems which include binary number systems and arithmetic operations, basic digital circuits, simplification of logic gates, combinational circuits and sequential circuits.  |                                       |   |                                  |                 |
| 5                     | <b>Teaching methods</b>   |                                       |   |                                  |                 |

|   |   |
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|   | lectures, practical works   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, practical skill assessment |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Barlian Henryranu Prasetio, Ph.D.   |
| 9 | <b>Other information</b><br>none  |

| <b>Distributed Computational System</b> |  |                                       |   |                                  |                        |
|---|--|---------------------------------------|---|----------------------------------|------------------------|
| module code<br>CCE60223                 | student workload<br>136.00 hours   | credits<br>(according to ECTS)<br>4.5 | semester<br>Sem. 5 or 7                 | frequency<br>each even-semester  | duration<br>1 semester |
| 1                                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                        |
| 2                                       | <b>Prerequisites for participation</b><br>none   |                                       |   |                                  |                        |
| 3                                       | <b>Learning outcomes</b><br>Able to explain the basic concepts and architecture of distributed systems<br>Able to explain the components in a distributed system architecture and explain the interactions between components<br>Able to explain the concept of operating system support in distributed system communication<br>Able to explain the communication methods used in distributed systems and their implementation<br>Able to explain coordination methods in distributed systems and their implementation<br>Able to explain the principle of consistency in distributed systems and their implementation<br>Able to explain the concept of system resistance to fault conditions and its implementation<br>Able to implement a simple distributed system |                                       |   |                                  |                        |
| 4                                       | <b>Subject aims</b>  |                                       |   |                                  |                        |

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|   | The Distributed Computing System course is an elective course that can be taken to provide insight into the concept of a distributed system including architecture, forming entities, communication and coordination methods, and methods developed to achieve a robust and reliable system. This course also trains students in implementing the concepts given in the form of a final project. Students are also given network programming skills in the project. |
| 5 | <b>Teaching methods</b><br>lectures   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |
| 8 | <b>Responsibility for module</b><br>Adhitya Bhawiyuga M.Sc.   |
| 9 | <b>Other information</b><br>none  |

| <b>Electronics Circuit I</b>   |   |  |   |  |                               |
|--------------------------------|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE62207 | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 2               | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>a) class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none  |  |   |  |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to apply electrical circuit analysis methods to electronic circuits.<br>Students are able to explain the basic theory and characteristic curves of diodes.<br>Students are able to explain the working principle of special diodes. |  |   |  |                               |

|   |  |
|---|--|
|   | <p>Students are able to explain the basic theory and characteristic curves of bipolar junction transistors.</p> <p>Students are able to apply the calculation of electrical quantities in the bias circuit of a bipolar junction transistor.</p>   |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the basics of electronic circuit analysis using the circuit analysis methods that have been taught, as well as the design of basic electronic circuits with passive and active components.</p> |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, quizzes, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Heru Nurwarsito, M.Kom.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Electronics Circuit II</b>  |   |  |   |                                       |                               |
|--------------------------------|---|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61208 | <b>student workload</b><br>181.33 hours                                       | <b>credits</b><br>(according to ECTS)<br>6 | <b>semester</b><br>Sem. 3               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>a) class<br>b) practical works                     | <b>contact hours</b><br>85.33 hours        | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>Already taken Electronics Circuit I |  |   |                                       |                               |

|   |   |
|---|---|
| 3 | <p><b>Learning outcomes</b></p> <p>Students are able to apply the calculation of electrical quantities in the junction field-effect transistor bias circuit.</p> <p>Students are able to apply the calculation of electrical quantities in metal-oxide-semiconductor field-effect transistor bias circuits.</p> <p>Students are able to explain the working principle of the complementary metal-oxide metal oxide semiconductor and its application to basic logic gates.</p> <p>Students are able to apply operational amplifier circuits like amplifiers, buffers, and comparators.</p> <p>Students are able to apply the calculation of the balance of the Wheatstone bridge circuit.</p> <p>Students are able to apply analog to digital converter circuits and calculate the conversion process.</p> <p>Students are able to apply signal conditioning circuits according to the characteristics of the input and output systems.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the working principle of operational amplifiers in electronic circuits and their applications in computer-based systems, as well as signal conditioning circuits used in electronic circuits.</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, practicum</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, quizzes, mid-term examination, end-term examination, competency examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Rizal Maulana, M.Sc.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Electronics Physics</b>     |  |  |                                      |                                       |                               |
|--------------------------------|--|--|--------------------------------------|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61202 | <b>student workload</b><br>58.67 hours   | <b>credits</b><br>(according to ECTS)<br>3 | <b>semester</b><br>Sem. I            | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>a) class  | <b>contact hours</b><br>26.67 hours        | <b>independent study</b><br>32 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none   |  |                                      |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain basic quantities and derivatives used in basic electronics.<br>Students are able to distinguish the concepts of impedance, inductance, and capacitance.<br>Students are able to apply power and energy calculations in an electronic circuit.<br>Students are able to use the basic laws of electric circuits in an electronic circuit.<br>Students are able to explain the basic concepts of semiconductor theory. |  |                                      |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses basic physics principles related to electricity, namely quantities, passive components, power and energy, basic laws of electrical circuits and semiconductor physics theory.   |  |                                      |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures  |  |                                      |                                       |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination   |  |                                      |                                       |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |  |                                      |                                       |                               |
| <b>8</b>                       | <b>Responsibility for module</b><br>Hurriyatul Fitriyah, M.Sc.   |  |                                      |                                       |                               |
| <b>9</b>                       | <b>Other information</b><br>none   |  |                                      |                                       |                               |

| <b>Embedded System</b>         |  |  |   |                                       |                               |
|--------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE62204 | <b>student workload</b><br>181.33 hours  | <b>credits</b><br>(according to ECTS)<br>6 | <b>semester</b><br>Sem. 4               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class, project-base, practicum  | <b>contact hours</b><br>85.33 hours        | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>already complete Microcontroller System course   |  |   |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain the meaning of embedded systems.<br>Students are able to apply design flow, specification, and modeling in the design of embedded systems.<br>Students are able to explain the use of computational models.<br>Students are able to explain the concept of scheduling and real-time operating system applications.<br>Students are able to explain the design of low-power computing.<br>Students are able to explain the principles of reliable system design.<br>Students are able to explain evaluation, validation, and optimization in embedded systems.<br>Students are able to build embedded systems according to engineering principles. |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses the method and design of embedded systems as well as the design and implementation in the form of a prototype which includes the characteristics of the Embedded System, Design flow, specification and modeling, computational models, scheduling, Real-Time Operating System, Low Power Computing, Reliable System Design, evaluation, and validation. , optimization   |  |   |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, discussion, presentation  |  |   |                                       |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, project evaluation, practical-skill assessment  |  |   |                                       |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b>  |  |   |                                       |                               |

|   |   |
|---|---|
|   | Sarjana Teknik (Bachelor of Engineering)                  |
| 8 | <b>Responsibility for module</b><br>Dahnial Syauqy, M.Sc. |
| 9 | <b>Other information</b><br>none                          |

| <b>English Language</b>        |  |  |   |                                       |                               |
|--------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>UBU60004 | <b>student workload</b><br>90.67 hours   | <b>credits</b><br>(according to ECTS)<br>3 | <b>semester</b><br>Sem. 1               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| 1                              | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours        | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students      |                               |
| 2                              | <b>Prerequisites for participation</b><br>none   |  |   |                                       |                               |
| 3                              | <b>Learning outcomes</b><br>Have the ability to understand explanations and relate information in texts in English<br>Acquire useful English vocabulary in the field of Information and Technology<br>Develop the necessary communicative skills in studying and working in the Information and Technology field             |  |   |                                       |                               |
| 4                              | <b>Subject aims</b><br>This course is designed to meet the special needs of students in the Faculty of Computer Science, Universitas Brawijaya (UB). This course is intended to help students improve their English language skills by covering topics that reflect developments in the field of information and technology. |  |   |                                       |                               |
| 5                              | <b>Teaching methods</b><br>lectures  |  |   |                                       |                               |
| 6                              | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |                                       |                               |
| 7                              | <b>This module is used in the following degree programs as well</b>  |  |   |                                       |                               |



|   |   |
|---|---|
|   | Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education) |
| 8 | <b>Responsibility for module</b><br>Pratnyawati Nuridi Suwarso, M.Li.   |
| 9 | <b>Other information</b><br>none  |

| <b>Entrepreneurship</b> |  |                                     |   |                                  |            |
|-------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code             | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| UBU60003                | 90.67 hours  | 3                                   | Sem. 4                                  | each even-semester               | 1 semester |
| 1                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |
| 2                       | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                       | <b>Learning outcomes</b><br>Understand the scope of entrepreneurship<br>Understand the meaning of entrepreneurship as orientation<br>Understand and be able to prepare business plans according to their interests<br>Understanding and being able to think creatively<br>Understand and have the entrepreneurial motivation<br>Have knowledge and leadership spirit<br>Understand and have the ability to communicate |                                     |   |                                  |            |
| 4                       | <b>Subject aims</b><br>This course provides students with an understanding of the importance of entrepreneurship as an orientation, being able to develop business plans, having creative, innovative thinking, being brave and able to calculate risk, understanding and having motivation, and having knowledge and leadership skills, and having the ability to communicate.  |                                     |   |                                  |            |
| 5                       | <b>Teaching methods</b><br>lectures  |                                     |   |                                  |            |

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| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education) |
| 8 | <b>Responsibility for module</b><br>Kariyoto, Dr.  |
| 9 | <b>Other information</b><br>none   |

| <b>Fault Tolerant Computer System</b> |   |  |   |  |                               |
|---------------------------------------|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60207        | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 6 or 8          | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                              | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                              | <b>Prerequisites for participation</b><br>none  |  |   |  |                               |
| <b>3</b>                              | <b>Learning outcomes</b><br>Students are able to explain the concept of Fault Tolerant on a computer system.<br>Students are able to analyze the nature of Fault Tolerant that exists in a computer system.<br>Students are able to design a Fault Tolerant System using the principle of Hardware Redundancy.<br>Students are able to design a Fault Tolerant System using the principle of Information Redundancy.<br>Students are able to design a Fault Tolerant System using the Time Redundancy principle.<br>Students are able to design a Fault Tolerant System using the principle of Software Redundancy. |  |   |  |                               |
| <b>4</b>                              | <b>Subject aims</b><br>This course discusses the concept and how to apply a fault tolerant system with the principle of redundancy  |  |   |  |                               |

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| 5 | <b>Teaching methods</b><br>lectures   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination                             |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Rakhmadhany Primananda, M.Kom.  |
| 9 | <b>Other information</b><br>none  |

| <b>FPGA Programming</b> |  |                                     |   |                                  |            |
|-------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code             | student workload   | credits<br>(according to ECTS)      | semester                                | frequency                        | duration   |
| CCE61206                | 136.00 hours   | 4.5                                 | Sem. 3                                  | each odd-semester                | 1 semester |
| 1                       | <b>Types of courses</b><br>class, project-base   | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                       | <b>Prerequisites for participation</b><br>already complete Digital System course   |                                     |   |                                  |            |
| 3                       | <b>Learning outcomes</b><br>Students are able to explain the basic principles of FPGA and its programming flow.<br>Students are able to build combinational circuits with FPGAs.<br>Students are able to build sequential circuits with FPGAs.<br>Students are able to use the concept of state machines in FPGA programming.<br>Students are able to use the test bench for FPGA simulation.<br>Students are able to apply the use of FPGA for digital system-based applications. |                                     |   |                                  |            |
| 4                       | <b>Subject aims</b><br>This course discusses the digital logic design and digital system design to be implemented using FPGA   |                                     |   |                                  |            |

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| 5 | <b>Teaching methods</b><br>lectures, discussion, presentation   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, project evaluation         |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Dahnial Syauqy, M.Sc.   |
| 9 | <b>Other information</b><br>none  |

| <b>High Performance Computer System</b> |  |                                     |   |                                  |            |
|---|--|-------------------------------------|---|----------------------------------|------------|
| module code                             | student workload   | credits<br>(according to ECTS)      | semester                                | frequency                        | duration   |
| CCE60208                                | 136.00 hours   | 4.5                                 | Sem. 6 or 8                             | each even-semester               | 1 semester |
| 1                                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                                       | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                                       | <b>Learning outcomes</b><br>Students are able to describe the components that make up System Administration<br>Students are able to operate System Administration device management<br>Students are able to demonstrate the concept of High Performance Computer<br>Students are able to build a High Performance Computer |                                     |   |                                  |            |
| 4                                       | <b>Subject aims</b><br>The High Performance Computer System course discusses the concept and implementation of Parallel and Cluster Computer Architecture and Organization to cloud platforms and their administration.  |                                     |   |                                  |            |
| 5                                       | <b>Teaching methods</b>  |                                     |   |                                  |            |

|   |   |
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|   | lectures  |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination                             |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Rakhmadhany Pramananda, M.Kom.  |
| 9 | <b>Other information</b><br>none  |

| <b>Human Computer Interaction</b> |   |                                     |   |                                  |            |
|-----------------------------------|---|-------------------------------------|---|----------------------------------|------------|
| module code                       | student workload  | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60210                          | 90.67 hours   | 3                                   | Sem. 5 or 7                             | each odd-semester                | 1 semester |
| 1                                 | <b>Types of courses</b><br>class  | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |
| 2                                 | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |            |
| 3                                 | <b>Learning outcomes</b><br><p>Students are able to explain the definition of user experience (UX) and its evolution.</p> <p>Students are able to explain the physical and non-physical aspects of UXD, including concepts from the human side, computers and interactions.</p> <p>Students are able to explain common human-computer interaction models.</p> <p>Students are able to apply common guidelines and standards.</p> <p>Students are able to apply the development of human-centered computer systems, including users with special needs.</p> <p>Students are able to explain the basic principles of effective GUI design, related to applications and platforms.</p> <p>Students are able to explain the tradeoffs of developing a UX system environment.</p> <p>Students are able to apply user support in device design.</p> |                                     |   |                                  |            |

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|   | <p>Students are able to apply the evaluation of existing interactive systems with the criteria of Human Centered Interaction.</p> <p>Students are able to explain the role of visualization technologies in human-computer interaction.</p> <p>Students are able to explain the role of social psychology in the design of user interfaces.</p> <p>Students are able to explain the advantages and disadvantages of biometric-based systems.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the role and application of various design concepts for interaction between humans and computers</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Mochammad Hannats Hanafi Ichsan, M.T.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Indonesian Language</b> |  |                                       |                          |                   |                 |
|----------------------------|--|---------------------------------------|--------------------------|-------------------|-----------------|
| <b>module code</b>         | <b>student workload</b>                | <b>credits</b><br>(according to ECTS) | <b>semester</b>          | <b>frequency</b>  | <b>duration</b> |
| MPK60007                   | 90.67 hours                            | 3                                     | Sem. 1                   | each odd-semester | 1 semester      |
| 1                          | <b>Types of courses</b>                | <b>contact hours</b>                  | <b>independent study</b> | <b>class size</b> |                 |
|                            | class                                  | 26.67 hours                           | 64.00 hours              | 45 students       |                 |
| 2                          | <b>Prerequisites for participation</b> |                                       |                          |                   |                 |
|                            | none                                   |                                       |                          |                   |                 |

|   |  |
|---|--|
| 3 | <p><b>Learning outcomes</b></p> <p>Able to show a positive attitude and love the Indonesian language by applying it ineffective communication in the academic environment.</p> <p>Able to understand and apply various languages according to the context of use informal/non-formal communication in the scientific field.</p> <p>Able to read critically scientific texts by linking them with previous schemata and contexts.</p> <p>Able to evaluate texts in scientific and popular writings in accordance with proper grammar and spelling rules.</p> <p>Able to explore creative and innovative ideas in writing scientific or popular scientific works.</p> <p>Able to produce scientific or popular writings in a systematic, logical, and empirical manner that deserves to be published in journals and mass media.</p>   |
| 4 | <p><b>Subject aims</b></p> <p>Indonesian is a Personality Development Course that aims to instill the basic values of love for the homeland through the national language. In particular, understanding and applying good and correct Indonesian in academic writing in various fields of science is a means of developing science and technology that must be mastered by students. The substance of this course is directed at learning Indonesian spoken and written in a systematic and logical manner through listening, reading, writing, and scientific speaking activities. On the technical aspect, this course equips students with the skills to explore ideas (content thoughts), write logically and systematically (organizational thoughts), write scientific and popular writing styles (style thoughts), and realize scientific and popular writings in their scientific field (purpose thoughts). ). In addition, the rules for scientific writing (scientific conventions) in Indonesian were also introduced which were integrated with efforts to form a scientific paradigm-based mindset.</p> |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Mokhamad Jainuri, M.Hum.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Information Technology Industrial Management</b> |  |  |   |                                       |                               |
|---|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE60214                      | <b>student workload</b><br>90.67 hours   | <b>credits</b><br>(according to ECTS)<br>3 | <b>semester</b><br>Sem. 5; Sem.<br>7    | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>  | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours        | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>  | <b>Prerequisites for participation</b><br>none   |  |   |                                       |                               |
| <b>3</b>  | <b>Learning outcomes</b><br><p>Students are able to apply concepts, knowledge and skills related to the basic concepts of project management</p> <p>Students are able to understand human resource management</p> <p>Students are able to understand the basics of teamwork</p> <p>Students are able to understand activities, targets and achievement results from the implementation of practical expertise projects</p> <p>Students are able to understand and apply the tools needed to handle projects</p> <p>Students are able to understand quantitative and qualitative approaches to risk assessment</p> <p>Students are able to understand planning for handling unexpected events</p> <p>Student are able to understand a more detailed explanation of the topic of the project implementation team</p> <p>Students are able to demonstrate how to use the method in a sequential manner, starting from project planning, implementation, and control through case studies.</p> |  |   |                                       |                               |
| <b>4</b>  | <b>Subject aims</b><br><p>This course will provide an understanding of the concept of applying the knowledge and skills that have been learned in the field of information technology to increase student competence in developing the process of a project in the information technology industry from a management point of view. Lectures are carried out with lectures, discussions and structured assignments as the application of the theory that has been obtained in lectures and evaluation in the form of assignments, Mid-Semester Exams (UTS) and Final Semester Exams (UAS).</p>   |  |   |                                       |                               |
| <b>5</b>  | <b>Teaching methods</b><br>lectures, discussion  |  |   |                                       |                               |



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| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination                             |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Nurudin Santoso, M.T.   |
| 9 | <b>Other information</b><br>none  |

| <b>Intelligent System Technology</b> |  |                                       |   |                                  |                 |
|--------------------------------------|--|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>                   | <b>student workload</b>  | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE60226                             | 90.67 hours  | 3                                     | Sem. 6; Sem. 8                          | each even-semester               | 1 semester      |
| 1                                    | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours   | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |                 |
| 2                                    | <b>Prerequisites for participation</b><br>none   |                                       |   |                                  |                 |
| 3                                    | <b>Learning outcomes</b><br>Students are able to explain the application of the latest technology in classification and clustering technology.<br>Students are able to explain the application of the latest technology in control and control technology.<br>Students are able to explain commonsense computing.<br>Students are able to explain wearable computing.<br>Students are able to explain the latest technology Ubiquitous Comp.<br>Students are able to explain the application of the latest technology in embedded applications in the medical world.<br>Students are able to explain the application of the latest technology related to state machines and low power computing. |                                       |   |                                  |                 |
| 4                                    | <b>Subject aims</b>  |                                       |   |                                  |                 |

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|   | This course discusses the latest technology in the science of intelligent systems and smart devices with updates through paper discussions |
| 5 | <b>Teaching methods</b><br>lectures, discussion  |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)                            |
| 8 | <b>Responsibility for module</b><br>Mochammad Hannats Hanafi Ichsan, M.T.  |
| 9 | <b>Other information</b><br>none   |

| <b>Intelligent System</b> |   |                                       |   |                                  |                 |
|---------------------------|---|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>        | <b>student workload</b>   | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE60221                  | 136.00 hours  | 4.5                                   | Sem. 6; Sem 8                           | each even-semester               | 1 semester      |
| 1                         | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| 2                         | <b>Prerequisites for participation</b><br>none  |                                       |   |                                  |                 |
| 3                         | <b>Learning outcomes</b><br>Students are able to explain about Intelligent Agents.<br>Students are able to explain Logical Agents and their applications.<br>Students are able to explain various Searching algorithms.<br>Students are able to explain logic programming and its application.<br>Students are able to explain and design a simple Expert System.<br>Students are able to explain Fuzzy Logic and understand various fuzzy algorithms and examples of their implementation. |                                       |   |                                  |                 |

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|   | <p>Students are able to explain the Naïve-Bayes algorithm.</p> <p>Students are able to explain artificial neural network algorithms and examples of their applications.</p> <p>Students are able to explain about Genetic Algorithm and examples of its application.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses various things related to intelligent systems, which include intelligent agents, searching algorithms, expert systems, fuzzy logic, artificial neural networks and genetic algorithms.</p>                           |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Mochammad Hannast Hanafi Ichsan, M.T.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Introduction of Computer Science</b> |  |  |   |                                  |                        |
|---|--|--|---|----------------------------------|------------------------|
| module code<br>COM60016                 | student<br>workload<br>90.67 hours   | credits<br>(according<br>to ECTS)<br>3 | semester<br>Sem. 1                      | frequency<br>each odd-semester   | duration<br>1 semester |
| 1                                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours    | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |                        |
| 2                                       | <b>Prerequisites for participation</b><br>none   |  |   |                                  |                        |
| 3                                       | <b>Learning outcomes</b><br>Students are able to explain various clusters of computer science in relation to the basic competencies of IT graduates and literacy 4.0 |  |   |                                  |                        |

|   |   |
|---|---|
|   | <p>Students are able to explain about computers which include a basic understanding of hardware, software and brain ware</p> <p>Students are able to explain several computer science topics including internet, network, database, software development and security</p> <p>Students are able to apply computational thinking, critical thinking, analytical thinking and logic of informatics in several examples of computer science cases</p> <p>Students are able to apply the concept of information technology integration in the learning process using several IT uses</p> <p>Students are able to understand several trends in technology development and research in the field of computer science</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course is designed as a course that helps students gain insight, knowledge, and trends in technological developments as well as basic skills to prepare for learning in the field of computer science in relation to each computer science family.</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Educational)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Eriq Muhammad Adams Jonemaro, M.Kom.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Islam Religion</b>   |                                 |                                     |                    |                                 |                        |
|-------------------------|---------------------------------|-------------------------------------|--------------------|---------------------------------|------------------------|
| module code<br>MPK60001 | student workload<br>90.67 hours | credits<br>(according to ECTS)<br>3 | semester<br>Sem. 2 | frequency<br>each even-semester | duration<br>1 semester |
| 1                       | Types of courses                | contact hours                       | independent study  | class size                      |                        |

|   |  |             |             |             |
|---|--|-------------|-------------|-------------|
|   | class  | 26.67 hours | 64.00 hours | 45 students |
| 2 | <b>Prerequisites for participation</b><br>none   |             |             |             |
| 3 | <b>Learning outcomes</b><br>Believe and fear Allah SWT.<br>Guiding students to have good morals (honest, trustworthy, hard work, responsibility, and discipline).<br>Guiding students to develop correct and critical thinking and reasoning in understanding various actual problems from an Islamic perspective.<br>Respect the rights of individuals and groups by providing freedom of expression with responsibility.<br>Able to apply morality in everyday life, both on campus, family, and community.<br>Able to build harmonious relationships and mutual respect in diversity. |             |             |             |
| 4 | <b>Subject aims</b><br>The Islamic Religion course is a Personality Development Course (MPK) which examines Islamic teachings as a source of values and guidelines that lead students to develop Islamic professions and personalities. After following the Islamic Religion course, students can develop their faith and piety, have knowledge and have a noble character, and make Islamic teachings the basis for thinking and behaving in professional development.  |             |             |             |
| 5 | <b>Teaching methods</b><br>lectures  |             |             |             |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |             |             |             |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)   |             |             |             |
| 8 | <b>Responsibility for module</b><br>Khalid Rahman, M.Pd.I.   |             |             |             |
| 9 | <b>Other information</b><br>none   |             |             |             |

| <b>Latest Network Architecture</b> |   |  |   |  |                               |
|------------------------------------|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60205     | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 4               | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                           | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                           | <b>Prerequisites for participation</b><br>Linear System   |  |   |  |                               |
| <b>3</b>                           | <b>Learning outcomes</b><br>Students are able to explain the basic concepts of one of the latest network technologies<br>Students are able to explain the architecture of one of the latest network technologies<br>Students are able to explain the communication mechanism between the components that make up the system<br>Students are able to explain the interaction between the components that make up the system<br>Students are able to identify research issues related to the latest network technology that is being discussed in lectures<br>Students are able to design a final project related to the latest network technology that is being discussed in lectures. |  |   |  |                               |
| <b>4</b>                           | <b>Subject aims</b><br>This course discusses the latest topics and technologies in the field of computer networks including basic concepts, architecture, constituent components, and the interactions between each component as well as related research issues.   |  |   |  |                               |
| <b>5</b>                           | <b>Teaching methods</b><br>lectures, discussion   |  |   |  |                               |
| <b>6</b>                           | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |  |   |  |                               |
| <b>7</b>                           | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |  |                               |
| <b>8</b>                           | <b>Responsibility for module</b><br>Achmad Basuki, Ph.D.  |  |   |  |                               |
| <b>9</b>                           | <b>Other information</b>  |  |   |  |                               |

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|------|
| none |
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| <b>Linier System</b>           |   |  |   |                                       |                               |
|--------------------------------|---|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61211 | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 3               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none  |  |   |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain the basics of signals and systems.<br>Students are able to calculate the total response of a system.<br>Students are able to calculate the Impulse response of a system.<br>Students are able to calculate convolutions.<br>Students are able to calculate the Laplace Transform.<br>Students are able to calculate Response Frequency.<br>Students are able to calculate the Fourier Transform.<br>Students are able to find Pole and Zero.<br>Students are able to find linear differential equations. |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses signal, impulse response, frequency response, frequency response and the application of convolution, Laplace transform, Fourier transform, linear differential equation.   |  |   |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, discussion   |  |   |                                       |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |  |   |                                       |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |                                       |                               |

|   |  |
|---|--|
| 8 | <b>Responsibility for module</b><br>Hurriyatul Fitriyah, M.Sc. |
| 9 | <b>Other information</b><br>none                               |

| <b>Microcontroller System</b> |  |                                     |   |                                  |            |
|-------------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code                   | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE61212                      | 181.33 hours   | 6                                   | Sem. 3                                  | each odd-semester                | 1 semester |
| 1                             | <b>Types of courses</b><br>class, project-base, practicum  | <b>contact hours</b><br>85.33 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                             | <b>Prerequisites for participation</b><br>already complete Digital System course   |                                     |   |                                  |            |
| 3                             | <b>Learning outcomes</b><br><p>Students are able to explain the meaning of microcontroller, microcontroller architecture, and microcontroller functions.</p> <p>Students are able to explain the memory organization of a microcontroller system.</p> <p>Students are able to create programs to access General I/O.</p> <p>Students are able to explain the interrupt system on the microcontroller and are able to make programs to run interrupts on the microcontroller.</p> <p>Students are able to explain the timer and counter system on the microcontroller and are able to make programs to run the timer and counter on the microcontroller.</p> <p>Students are able to explain serial communication on a microcontroller and are able to make programs to run serial communication on a microcontroller.</p> <p>Students are able to explain several kinds of microcontroller platforms.</p> <p>Students are able to design and create applications using a microcontroller system.</p> |                                     |   |                                  |            |
| 4                             | <b>Subject aims</b><br><p>This course explains microcontrollers and their architecture, as well as applying low and high-level programming to design interfaces to memory, serial ports, parallel ports, use of interrupts and timers, and counters.</p>   |                                     |   |                                  |            |



|   |   |
|---|---|
| 5 | <b>Teaching methods</b><br>lectures, discussion, presentation   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, project evaluation, practical-skill assessment |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)                     |
| 8 | <b>Responsibility for module</b><br>Agung Setia Budi, Ph.D  |
| 9 | <b>Other information</b><br>none  |

| <b>Mobile Device</b> |   |                                     |   |                                  |            |
|----------------------|---|-------------------------------------|---|----------------------------------|------------|
| module code          | student workload  | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60220             | 90.67 hours   | 3                                   | Sem. 6; Sem. 8                          | each even-semester               | 1 semester |
| 1                    | <b>Types of courses</b><br>class  | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |
| 2                    | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |            |
| 3                    | <b>Learning outcomes</b><br>Students are able to explain the development of mobile device technology.<br>Students are able to explain various hardware on mobile devices.<br>Students are able to explain various software on mobile devices.<br>Students are able to apply the basic concepts of mobile device programming.<br>Students are able to apply programming for mobile device data acquisition.<br>Students are able to apply programming to store data. |                                     |   |                                  |            |
| 4                    | <b>Subject aims</b>   |                                     |   |                                  |            |

|   |   |
|---|---|
|   | This course discusses various things related to mobile devices, both technology, hardware and software, as well as various programming related to data acquisition and simple processing. |
| 5 | <b>Teaching methods</b><br>lectures, discussion   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |
| 8 | <b>Responsibility for module</b><br>Dahnial Syauqy, M.Sc.   |
| 9 | <b>Other information</b><br>none  |

| <b>Mobile Robot Programming</b> |  |                                     |   |                                  |            |
|---------------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code                     | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60217                        | 136.00 hours   | 4.5                                 | Sem. 6 or 8                             | each even-semester               | 1 semester |
| 1                               | <b>Types of courses</b><br>class, final-project  | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                               | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                               | <b>Learning outcomes</b><br>Students are able to understand the design and structure of wheeled robots<br>Students are able to explain the algorithm for determining the location and navigation of the robot<br>Students are able to explain maze exploration<br>Students are able to explain mapping<br>Students are able to explain communication methods between robots<br>Students are able to demonstrate a wheeled robot simulation |                                     |   |                                  |            |
| 4                               | <b>Subject aims</b>  |                                     |   |                                  |            |

|   |   |
|---|---|
|   | This course discusses various algorithms related to the development of wheeled robots, which include location determination, maze exploration, mapping, communication and simulation. |
| 5 | <b>Teaching methods</b><br>lectures, project-based  |
| 6 | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination, project assessment  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |
| 8 | <b>Responsibility for module</b><br>Dahnial Syauqy, M.Sc.   |
| 9 | <b>Other information</b><br>none  |

| <b>Advanced Computer Architecture and Organization</b> |  |                                       |   |                                  |                 |
|--|--|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>                                     | <b>student workload</b>  | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE61201   | 136.00 hours   | 4.5                                   | Sem. 3                                  | each odd-semester                | 1 semester      |
| 1  | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| 2  | <b>Prerequisites for participation</b><br>already taken Computer Architecture and Organization course  |                                       |   |                                  |                 |
| 3  | <b>Learning outcomes</b><br>Students are able to design the ALU on the computer processor (CPU).<br>Students are able to design the existing datapath on the computer.<br>Students are able to design the Control Unit (CU) on the computer.<br>Students are able to design microcodes according to the type of Instruction Set Architecture (ISA) on the computer, both RISC and CISC.<br>Students are able to diagnose the computer they have designed through the debugging process.<br>Students are able to explain ISA on a computer. |                                       |   |                                  |                 |

|   |  |
|---|--|
|   | <p>Students are able to explain the compiler on the computer.</p> <p>Students are able to explain the input-output of a computer.</p> <p>Students are able to explain cache memory.</p> <p>Students are able to explain process state and memory management.</p> <p>Students are able to explain the pipeline on the computer.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the continuation of Computer Architecture and Organization in terms of design and in-depth analysis of how the CPU, memory and input-output work</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Rakhmadhany Primananda, M.Kom.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Computer System and Networking Analysis</b> |  |  |  |  |                               |
|--|--|--|--|--|-------------------------------|
| <b>module code</b><br>CCE62205                 | <b>student workload</b><br>181.00 hours        | <b>credits</b><br>(according to ECTS)<br>6 | <b>semester</b><br>Sem. 2                | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                                       | <b>Types of courses</b><br>class               | <b>contact hours</b><br>53.00 hours        | <b>independent study</b><br>128.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                                       | <b>Prerequisites for participation</b><br>none |  |  |  |                               |

|   |   |
|---|---|
| 3 | <b>Learning outcomes</b><br>Students are able to understand and calculate the concepts of calculus of functions, limits, derivatives and integrals.<br>Students are able to understand and calculate linear algebra concepts including matrices, vectors, systems of linear equations and linear transformations. |
| 4 | <b>Subject aims</b><br>The course discusses calculus and linear algebra in relation to computer science learning  |
| 5 | <b>Teaching methods</b><br>lectures, discussion   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |
| 8 | <b>Responsibility for module</b><br>Achmad Ridok, Dr.   |
| 9 | <b>Other information</b><br>none  |

| <b>Advanced Programming</b> |  |                                     |   |                                  |                        |
|-----------------------------|--|-------------------------------------|---|----------------------------------|------------------------|
| module code<br>CCE61207     | student workload<br>181.33 hours   | credits<br>(according to ECTS)<br>6 | semester<br>Sem. 2                      | frequency<br>each even-semester  | duration<br>1 semester |
| 1                           | <b>Types of courses</b><br>class   | <b>contact hours</b><br>85.33 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                        |
| 2                           | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |                        |
| 3                           | <b>Learning outcomes</b><br>Students are able to explain the basic concepts of Python programming.<br>Students are able to apply structured programming using condition selection and loops. |                                     |   |                                  |                        |

|   |  |
|---|--|
|   | <p>Students are able to apply text and string manipulation, use lists, tuples and dictionaries, searching, sorting.</p> <p>Students are able to design and implement the use of functions and recursion.</p> <p>Students are able to apply OOP programming and classroom concepts.</p> <p>Students are able to implement GUI using Python.</p> <p>Students are able to apply multithreading and client/server programming.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the application of Python programming starting from the IDE, syntax, data types, conditions, functions, to the concept of OOP, multithreading, GUI and Event Driven Programming.</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Mochammad Hannast Hanafi Ichsan, M.T.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Aerial Robotics</b> |  |                                       |   |                                  |                 |
|------------------------|--|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>     | <b>student workload</b>                        | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE60203               | 136.00 hours                                   | 4.5                                   | Sem. 6 or 8                             | each even-semester               | 1 semester      |
| 1                      | <b>Types of courses</b><br>class, project-base | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| 2                      | <b>Prerequisites for participation</b><br>none |                                       |   |                                  |                 |

|   |  |
|---|--|
| 3 | <b>Learning outcomes</b><br>Students are able to explain the components of aerial robotics systems.<br>Students are able to explain the movement mechanism of the quadcopter.<br>Students are able to calculate robot positioning techniques.<br>Students are able to explain mapping techniques.<br>Students are able to explain the control system on a quadcopter.<br>Students are able to explain navigation and planning.<br>Students are able to demonstrate the quadcopter in the simulation. |
| 4 | <b>Subject aims</b><br>This course discusses UAV/quadcopter drones ranging from components, movement and navigation, location determination, mapping, and control.   |
| 5 | <b>Teaching methods</b><br>lectures, discussion, presentation  |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, project evaluation  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |
| 8 | <b>Responsibility for module</b><br>Eko Setiawan, Ph.D.  |
| 9 | <b>Other information</b><br>none   |

| <b>Algorithm Design and Analysis</b> |                                  |                                    |                                  |                                 |                        |
|--------------------------------------|----------------------------------|------------------------------------|----------------------------------|---------------------------------|------------------------|
| module code<br>CCE62203              | student workload<br>136.00 hours | credits (according to ECTS)<br>4.5 | semester<br>Sem. 4               | frequency<br>each even-semester | duration<br>1 semester |
| 1                                    | Types of courses<br>class        | contact hours<br>40.00 hours       | independent study<br>96.00 hours | class size<br>45 students       |                        |
| 2                                    | Prerequisites for participation  |                                    |                                  |                                 |                        |

|   |   |
|---|---|
|   | none  |
| 3 | <p><b>Learning outcomes</b></p> <p>Able to understand design concepts and algorithmic analysis in solving broad problems and able to study various examples of algorithms and their application</p> <p>Able to design, and perform analytical calculations, to determine the correctness and accuracy of several algorithms including non-recursive algorithms, order of growth, asymptotic notation, recursive algorithms, brute force, greedy, divide &amp; conquer, decrease &amp; conquer dynamic programming, and backtracking algorithms, to relevant cases in various fields and multi-disciplines.</p> <p>Able to apply design concepts and algorithmic analysis in the form of program code.</p>       |
| 4 | <p><b>Subject aims</b></p> <p>Algorithm Design and Analysis is a compulsory subject that provides knowledge of descriptions of various kinds of algorithms from basic to advanced based on the characteristics of the case study, with various techniques commonly used to design and analyze algorithms broadly, both simple and very complex. Then it can also be used to identify the validity of an algorithm in certain cases, as well as compare several algorithms and be able to determine which algorithm is the best to solve a problem efficiently and effectively before it is implemented, as well as provide the ability to analyze the algorithm in the implementation of computer programs.</p> |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, quizzes, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Achmad Ridok, Dr.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>   |



| <b>Applied Database</b>        |  |  |   |  |                               |
|--------------------------------|--|--|---|--|-------------------------------|
| <b>module code</b><br>CCE62202 | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 2               | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none   |  |   |  |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to apply principles to database devices<br>Students are able to master the concepts of architecture to the working principles of databases<br>Students are able to study scientifically about formulation and problem solving systems using database techniques and devices independently and measurably<br>Students are able to study engineering, maintenance, and database system development   |  |   |  |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses the concept of databases, relational models as well as designing and handling operations on databases, so that students are able to understand concepts, perform designs and can handle operations involving databases. In the concept and design section, students are expected to be able to categorize data models and design relational models that are used to design data storage forms in normal form. In the operation, students are expected to be able to perform queries to manipulate data. |  |   |  |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, discussion  |  |   |  |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |  |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |  |   |  |                               |
| <b>8</b>                       | <b>Responsibility for module</b><br>Achmad Arwan, M.Kom.   |  |   |  |                               |
| <b>9</b>                       | <b>Other information</b><br>none   |  |   |  |                               |

| <b>Basic Programming</b>       |   |  |   |                                       |                               |
|--------------------------------|---|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>COM60014 | <b>student workload</b><br>181.33 hours   | <b>credits</b><br>(according to ECTS)<br>6 | <b>semester</b><br>Sem. 1               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class  | <b>contact hours</b><br>85.33 hours        | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none  |  |   |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br><p>Students are able to understand, abstract, and identify simple computational problems into a structured programming approach</p> <p>Students are able to develop algorithms in the form of flowcharts and/or pseudocode with a structured programming approach to solve simple computational problems</p> <p>Able to make computer programs with a structured programming approach for simple computing problems using programming languages</p> |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br><p>Basic Programming is a subject that must be mastered by students of the Faculty of Computer Science. This Basic Programming provides knowledge about algorithms and structured programming and applies them to programming languages in simple computing problems. This course is the foundation and prerequisite for courses in the following semester.</p>  |  |   |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, discussion   |  |   |                                       |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |  |   |                                       |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |                                       |                               |
| <b>8</b>                       | <b>Responsibility for module</b><br>Sutrisno, M.T.  |  |   |                                       |                               |
| <b>9</b>                       | <b>Other information</b><br>none  |  |   |                                       |                               |

| <b>Capita Selecta</b>          |  |  |   |  |                               |
|--------------------------------|--|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60211 | <b>student workload</b><br>90.67 hours   | <b>credits</b><br>(according to ECTS)<br>3 | <b>semester</b><br>Sem. 6; Sem. 8       | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours        | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none   |  |   |  |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br><p>Students are able to explain a broad overview of computer engineering.</p> <p>Students are able to explain the latest computer engineering applications in the industrial field.</p> <p>Students are able to explain the latest computer engineering applications in the field of agriculture.</p> <p>Students are able to explain the latest computer engineering applications in the health sector.</p> <p>Students are able to explain the latest computer engineering applications in the home automation field.</p> <p>Students are able to explain the latest computer engineering applications in the field of science.</p> <p>Students are able to explain the latest developments and technology in Computer Engineering..</p> |  |   |  |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses the application of computer engineering in various fields   |  |   |  |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, discussion  |  |   |  |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |  |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |  |   |  |                               |
| <b>8</b>                       | <b>Responsibility for module</b><br>Agung Setia Budi, Ph.D.  |  |   |  |                               |
| <b>9</b>                       | <b>Other information</b><br>none   |  |   |  |                               |

| <b>Citizenship</b>             |   |  |   |                                       |                               |
|--------------------------------|---|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>MPK60006 | <b>student workload</b><br>90.67 hours  | <b>credits</b><br>(according to ECTS)<br>3 | <b>semester</b><br>Sem. 3               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class  | <b>contact hours</b><br>26.67 hours        | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none  |  |   |                                       |                               |
| <b>3</b>                       | <p><b>Learning outcomes</b></p> <p>Students are able to understand the nature of civic education in the development of full-fledged undergraduate or professional abilities and link the values of Pancasila with the subject matter in the Citizenship Education course.</p> <p>Students are able to interpret the concept of the Unitary State of the Republic of Indonesia and identify and recognize the uniqueness of the Indonesian legal state which is based on the values of Pancasila.</p> <p>Students are able to understand the supremacy of the constitution and the peculiarities of the 1945 Constitution of the Republic of Indonesia which is based on the values of Pancasila and to sort out constitutional and unconstitutional behavior in the life of the nation and state.</p> <p>Students are able to understand, identify, and defend national identity from popular culture in the current of globalization.</p> <p>Students are able to build awareness and believe in the importance of involvement or participation in the practice of Pancasila democracy.</p> <p>Students are able to examine Pancasila as the philosophical foundation of Human Rights in the State of Indonesia and compromise between human rights and obligations in the life of the nation and state.</p> <p>Students are able to understand the concepts of geopolitics and geopolitics in Indonesia as well as classify the potential for diversity of natural resources and human resources in the concept of regional autonomy based on the Archipelago Insight.</p> <p>Students are able to show a sense of love for the homeland, have nationalism, and have a sense of responsibility to the country and nation.</p> |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b>   |  |   |                                       |                               |

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|   | Citizenship course is a compulsory national course included in the Personality Development Course (MPK) of Universitas Brawijaya which functions as student orientation in strengthening the insight and spirit of nationalism, love for the homeland, democracy, legal awareness, respect for diversity, and participation in building the nation and state based on Pancasila, with a weight of 2 credits. |
| 5 | <b>Teaching methods</b><br>lectures  |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)   |
| 8 | <b>Responsibility for module</b><br>Rizki Agung Novariyanto, M.Pd.   |
| 9 | <b>Other information</b><br>none   |

| <b>Computer System and Networking Analysis</b> |  |                                     |   |                                  |            |
|--|--|-------------------------------------|---|----------------------------------|------------|
| module code                                    | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| COM60015                                       | 136.00 hours   | 4.5                                 | Sem. 1                                  | each odd-semester                | 1 semester |
| 1  | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2  | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3  | <b>Learning outcomes</b><br>Students are able to explain discrete concepts in the field of computer science<br>Students are able to apply logical inference<br>Students are able to apply the concepts of sets, relations and functions<br>Students are able to apply the concepts of series, sequence and induction |                                     |   |                                  |            |

|   |   |
|---|---|
|   | <p>Students are able to apply the concepts of counting, discrete probability, and number theory</p> <p>Students are able to apply the concept of recurrence</p> <p>Students are able to understand matrices and vectors</p>   |
| 4 | <p><b>Subject aims</b></p> <p>This course is a compulsory subject with no prerequisites that must be completed first by students. The material for this course provides an understanding of discrete concepts, logical inference concepts, sets, relations and functions, series and sequences, mathematical induction, enumeration, discrete probability, number theory, recurrence, matrices, and vectors. Lectures are carried out with lectures, discussions, and structured assignments as the application of the theory that has been obtained in lectures.</p> |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Edy Santoso, M.Kom.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Computer Architecture and Organization</b> |  |                                       |   |                                  |                 |
|---|--|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>                            | <b>student workload</b>                        | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| COM60011                                      | 136.00 hours                                   | 4.5                                   | Sem. 2                                  | each even-semester               | 1 semester      |
| 1   | <b>Types of courses</b><br>class               | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| 2   | <b>Prerequisites for participation</b><br>none |                                       |   |                                  |                 |

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|---|---|
| 3 | <p><b>Learning outcomes</b></p> <p>Students are able to describe the history of the development of computer evolution.</p> <p>Students are able to describe the architecture and organization of the processor (CPU) on a computer.</p> <p>Students are able to describe the architecture and organization of memory on a computer.</p> <p>Students are able to describe the interface of input-output (IO) and other peripherals that exist or are connected to a computer.</p> <p>Students are able to describe the components of a digital system for those on a computer.</p> <p>Students are able to describe logical and arithmetic operations performed by computers.</p> <p>Students are able to describe the Instruction Set Architecture (ISA) that exists and is used on computers.</p> <p>Students are able to describe the existing multicore architecture on computers.</p> <p>Students are able to describe the architecture of distributed systems used on computers.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses Computer Architecture and Organization consisting of Processors, Memory, Input-output, and Instruction Set Architecture (ISA) and discusses the latest computer developments related to multicore and Distributed Computer Systems.</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Mochammad Hannast Hanafi Ichsan, M.T.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Computer Network Administration</b> |  |  |   |                                       |                               |
|--|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE60201         | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 5 or 7          | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                               | <b>Types of courses</b><br>class, case-based   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                               | <b>Prerequisites for participation</b><br>have already taken a Computer Networking course  |  |   |                                       |                               |
| <b>3</b>                               | <b>Learning outcomes</b><br>Students are able to explain the general routing description on the network<br>Students are able to explain several routing algorithms and protocols<br>Students are able to explain flow models on the network<br>Students are able to explain IP routing and several distance-vector routing protocols<br>Students are able to explain network traffic engineering<br>Students are able to explain router architecture<br>Students are able to explain queuing and packet scheduling<br>Students are able to explain traffic conditioning<br>Students are able to apply routing mechanisms and network service quality using a simulator |  |   |                                       |                               |
| <b>4</b>                               | <b>Subject aims</b><br>This course discusses several routing protocols on the Internet and their traffic engineering mechanisms and service quality.   |  |   |                                       |                               |
| <b>5</b>                               | <b>Teaching methods</b><br>lectures, discussion  |  |   |                                       |                               |
| <b>6</b>                               | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, participation evaluation  |  |   |                                       |                               |
| <b>7</b>                               | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |  |   |                                       |                               |
| <b>8</b>                               | <b>Responsibility for module</b><br>Reza Andria Siregar, M.Kom.  |  |   |                                       |                               |
| <b>9</b>                               | <b>Other information</b>   |  |   |                                       |                               |



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| none |
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| <b>Computer Networking</b>     |  |  |   |                                       |                               |
|--------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61203 | <b>student workload</b><br>181.33 hours  | <b>credits</b><br>(according to ECTS)<br>6 | <b>semester</b><br>Sem. 5               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class, practicum  | <b>contact hours</b><br>85.33 hours        | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none   |  |   |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain how computer networks work.<br>Students are able to explain the concepts and workings of the application layer on the internet.<br>Students are able to explain the concepts and workings of the transport layer on the internet.<br>Students are able to explain the concepts and workings of the network layer on the internet.<br>Students are able to explain the concept and how the link-layer works on the internet. |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses the concepts and workings of computer networks using a layered approach. The division of layers is based on the standard Internet Protocol Stack, starting from the Application, Transport, Network layer to the Data Link layer.   |  |   |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, practical works   |  |   |                                       |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, practical-skill evaluation  |  |   |                                       |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer)   |  |   |                                       |                               |
| <b>8</b>                       | <b>Responsibility for module</b><br>Fariz Andri Bakhtiar, M.Kom.   |  |   |                                       |                               |
| <b>9</b>                       | <b>Other information</b>   |  |   |                                       |                               |

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| none |
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| <b>Computer Security</b>       |  |  |   |                                       |                               |
|--------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61204 | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 5               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>Linear System  |  |   |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain the basic concepts of computer security.<br>Students are able to explain the types of system security vulnerabilities.<br>Students are able to explain the concept of CIA security (Confidentiality, Integrity, Availability).<br>Students are able to apply classical security algorithms.<br>Students are able to apply encryption algorithms.<br>Students are able to apply asymmetric key algorithms.<br>Students are able to solve problems in case studies that have been taught in previous chapters.<br>Students are able to apply block cipher algorithms.<br>Students are able to explain the concepts of data integrity and authentication.<br>Students are able to apply data integrity algorithms.<br>Students are able to apply authentication algorithms.<br>Students are able to explain the Law on Information and Electronic Transactions (UU ITE).<br>Students are able to complete a final project on a case study. |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses computer security, types of system security vulnerabilities, security concepts and various algorithms related to computer security  |  |   |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, discussion  |  |   |                                       |                               |

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| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination                             |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Fariz Andri Bakhtiar, M.Kom.  |
| 9 | <b>Other information</b><br>none  |

| <b>Computer System and Networking Analysis</b> |   |                                       |   |                                  |                 |
|--|---|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>                             | <b>student workload</b>   | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE60204                                       | 136.00 hours  | 4.5                                   | Sem. 5 or 7                             | each odd-semester                | 1 semester      |
| 1  | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| 2  | <b>Prerequisites for participation</b><br>have already taken Statistics course  |                                       |   |                                  |                 |
| 3  | <b>Learning outcomes</b><br>Students are able to explain the introduction to performance evaluation.<br>Students are able to explain the discussion of performance evaluation.<br>Students are able to explain the types of workloads.<br>Students are able to explain workload characterization techniques.<br>Students are able to solve problems from M1 – M4.<br>Students are able to explain capacity planning and benchmarking.<br>Students are able to explain data representation.<br>Students are able to apply ratio games in detail.<br>Students are able to analyze the system with sample data.<br>Students are able to build models with linear regression.<br>Students are able to solve problems from M8 – M10. |                                       |   |                                  |                 |

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|   | <p>Students are able to analyze queuing theory.</p> <p>Students are able to analyze the performance of web services.</p> <p>Students are able to analyze system comparisons or model development.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course provides an overview of computer system performance analysis</p>  |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Rakhmadhany Primananda, M.Kom.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Computer System Engineering</b> |  |                                       |   |                                  |                        |
|------------------------------------|--|---------------------------------------|---|----------------------------------|------------------------|
| module code<br>CCE61209            | student workload<br>136.00 hours   | credits<br>(according to ECTS)<br>4.5 | semester<br>Sem. 5                      | frequency<br>each odd-semester   | duration<br>1 semester |
| 1                                  | <b>Types of courses</b><br>class, project-based  | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                        |
| 2                                  | <b>Prerequisites for participation</b><br>have already taken 60 credits (90 ECTS)  |                                       |   |                                  |                        |
| 3                                  | <b>Learning outcomes</b><br><p>Students are able to explain the concept of the Socio-Technical System.</p> <p>Students are able to explain the concept of Critical Systems.</p> <p>Students are able to express Hardware and software Processes.</p> <p>Students are able to design Requirements Analysis.</p> |                                       |   |                                  |                        |

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|   | Students are able to describe the Feasibility of System Architecture.   |
| 4 | <b>Subject aims</b><br>This course discusses the concepts and processes of computer systems engineering         |
| 5 | <b>Teaching methods</b><br>lectures, discussion, presentation   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination                             |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Eko Setiawan, Ph.D.   |
| 9 | <b>Other information</b><br>none  |

| <b>Computer-based Medical System</b> |  |                                     |   |                                  |            |
|--------------------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code                          | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60224                             | 136.00 hours   | 4.5                                 | Sem. 6 or 8                             | each even-semester               | 1 semester |
| 1                                    | <b>Types of courses</b><br>class, case-study   | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                                    | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                                    | <b>Learning outcomes</b><br>Students are able to explain the basic concepts of medical instrumentation.<br>Students are able to explain bio signals, bioelectric signals, and biopotentials that exist in the human body.<br>Students are able to explain the technique of recording electrical activity in the human body using electrodes. |                                     |   |                                  |            |

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|   | <p>Students are able to explain the technique of recording changes in blood volume in microvascular tissue using optical sensors.</p> <p>Students are able to apply initial processing to bio signals.</p> <p>Students are able to analyse bio signals using a computer-based system.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses bio signals and their acquisition techniques, as well as how to process them using a computer-based system</p>  |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, quizzes, mid-term examination, end-term examination, active-learning assessment</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Rizal Maulana, M.Sc.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Control System</b> |   |                             |                   |                    |            |
|-----------------------|---|-----------------------------|-------------------|--------------------|------------|
| module code           | student workload  | credits (according to ECTS) | semester          | frequency          | duration   |
| CCE60222              | 136.00 hours  | 4.5                         | Sem. 6; Sem 8     | each even-semester | 1 semester |
| 1                     | Types of courses  | contact hours               | independent study | class size         |            |
|                       | class   | 40.00 hours                 | 96.00 hours       | 45 students        |            |
| 2                     | Prerequisites for participation   |                             |                   |                    |            |
|                       | none  |                             |                   |                    |            |
| 3                     | Learning outcomes   |                             |                   |                    |            |
|                       | <p>Students are able to explain the definition and function of control systems.</p> <p>Students are able to explain the stages of the control system.</p> |                             |                   |                    |            |

|   |  |
|---|--|
|   | <p>Students are able to calculate the mathematical model of a system.</p> <p>Students are able to use control systems to solve simple problems.</p> <p>Students are able to demonstrate the application of control systems in simulation software.</p> <p>Students are able to explain the working principle of PID control.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the concept and application of control systems to solve simple problems using computer-based systems.</p>  |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Eko Setiawan, Ph.D.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Data Communication</b> |  |   |  |   |                                       |                               |
|---------------------------|--|---|--|---|---------------------------------------|-------------------------------|
|                           | <b>module code</b><br>CCE61205   | <b>student workload</b><br>136.00 hours | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 3               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| 1                         | <b>Types of courses</b><br>class   |   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| 2                         | <b>Prerequisites for participation</b><br>none   |   |  |   |                                       |                               |
| 3                         | <b>Learning outcomes</b><br><p>Students are able to explain the concept of data transmission.</p> <p>Students are able to explain the types of transmission media.</p> |   |  |   |                                       |                               |

|   |  |
|---|--|
|   | <p>Students are able to explain various data encoding techniques.</p> <p>Students are able to explain the types of noise and errors in transmission media.</p> <p>Students are able to explain various kinds of data communication interfaces.</p> <p>Students are able to explain the concept of Data Link Control Protocol.</p> <p>Students are able to explain multiplexing and spread spectrum techniques.</p> <p>Students are able to explain the types of multiple access techniques on transmission media.</p> <p>Students are able to explain several kinds of wireless communication technology.</p> <p>Students are able to explain several kinds of process automation communication protocols.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course provides knowledge related to the concept of data transmission contained in computer systems. Several techniques and protocols used in transmitting data will be discussed in detail in this course.</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Reza Andria Siregar, M.Kom.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Data Flow Programming</b> |                                  |                                     |   |                                  |            |
|------------------------------|----------------------------------|-------------------------------------|---|----------------------------------|------------|
| module code                  | student workload                 | credits<br>(according to ECTS)      | semester                                | frequency                        | duration   |
| CCE60206                     | 136.00 hours                     | 4.5                                 | Sem. 6; Sem. 8                          | each even-semester               | 1 semester |
| 1                            | <b>Types of courses</b><br>class | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |



|   |   |
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| 2 | <b>Prerequisites for participation</b><br>Basic Programming   |
| 3 | <b>Learning outcomes</b><br>Students are able to explain the Dataflow Programming paradigm and its Environment.<br>Students are able to apply for structured data and programs with Dataflow Programming.<br>Students are able to implement access to computer resources using Dataflow Programming.<br>Students are able to apply User Interface and Input-Output with Dataflow Programming.<br>Students are able to build distributed applications with Dataflow Programming. |
| 4 | <b>Subject aims</b><br>This course discusses the new paradigm in programming using the concept of data flow.  |
| 5 | <b>Teaching methods</b><br>lectures, discussion   |
| 6 | <b>Assessment methods</b><br>project assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |
| 8 | <b>Responsibility for module</b><br>Mochammad Hannast Hanafi Ichsan, M.T.   |
| 9 | <b>Other information</b><br>none  |

| <b>Data Structure and Algorithm</b> |  |                                     |   |                                  |            |
|-------------------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code                         | student workload                               | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE62201                            | 181.33 hours                                   | 6                                   | Sem. 2                                  | each even-semester               | 1 semester |
| 1                                   | <b>Types of courses</b><br>class, practicum    | <b>contact hours</b><br>85.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                                   | <b>Prerequisites for participation</b><br>none |                                     |   |                                  |            |

|   |   |
|---|---|
| 3 | <b>Learning outcomes</b><br>Able to understand the basic concepts of abstract data type (ADT) in data structures<br>Able to abstract, identify and apply linear and/or non-linear data structures to solve computational problems<br>Able to understand and apply data search algorithms<br>Able to understand and apply data sorting algorithm<br>Able to understand and apply hashing algorithm   |
| 4 | <b>Subject aims</b><br>This course will provide an understanding of how to determine and implement appropriate data structures and algorithms to solve a particular problem by paying attention to efficiency and effectiveness. Algorithm is used as an approach to be able to compose and manage instructions efficiently. Data structures are used to manage data effectively. This lecture is carried out by providing material, assignments and discussions in class and practicum |
| 5 | <b>Teaching methods</b><br>lectures, practical works  |
| 6 | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination, practical work assessment   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |
| 8 | <b>Responsibility for module</b><br>Sutrisno, M.T.  |
| 9 | <b>Other information</b><br>none  |

| <b>Digital Image Computation</b> |                                  |                                     |   |                                  |            |
|----------------------------------|----------------------------------|-------------------------------------|---|----------------------------------|------------|
| module code                      | student workload                 | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60213                         | 136.00 hours                     | 4.5                                 | Sem. 6; Sem 8                           | each even-semester               | 1 semester |
| 1                                | <b>Types of courses</b><br>class | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |

|   |  |
|---|--|
| 2 | <p><b>Prerequisites for participation</b></p> <p>none</p>  |
| 3 | <p><b>Learning outcomes</b></p> <p>Students are able to explain about digital images and the application of digital images in everyday life.</p> <p>Students are able to explain various digital image formats.</p> <p>Students are able to explain various color spaces and the implementation of the use of color spaces in digital image processing.</p> <p>Students are able to explain the scaling methods used in digital image processing.</p> <p>Students are able to explain the process of digital image segmentation.</p> <p>Students are able to explain and perform digital image processing in the frequency domain.</p> <p>Students are able to explain morphological operations in Image Processing.</p> <p>Students are able to explain various filters and their applications in digital image processing.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses various techniques for applying digital image computing.</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Fitri Utaminingrum, Dr.Eng.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Digital System</b>          |   |  |   |                                       |                               |
|--------------------------------|---|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61210 | <b>student workload</b><br>181.33 hours   | <b>credits</b><br>(according to ECTS)<br>6 | <b>semester</b><br>Sem. 1               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class, practicum   | <b>contact hours</b><br>85.33 hours        | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none  |  |   |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to process the binary number system.<br>Students are able to design a digital system consisting of several basic logic gates.<br>Students are able to design a digital system consisting of a combinational circuit.<br>Students are able to design a digital system consisting of a sequential circuit.<br>Students are able to design a digital system that utilizes a Programmable Logic Device (PLD).<br>Students are able to design a simple digital system to solve a concrete problem. |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course provides a basic understanding of the basic concepts and implementations of digital systems which include binary number systems and arithmetic operations, basic digital circuits, simplification of logic gates, combinational circuits and sequential circuits.  |  |   |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, practical works  |  |   |                                       |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, practical skill assessment   |  |   |                                       |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |                                       |                               |
| <b>8</b>                       | <b>Responsibility for module</b><br>Barlian Henryranu Prasetio, Ph.D.   |  |   |                                       |                               |
| <b>9</b>                       | <b>Other information</b><br>none  |  |   |                                       |                               |

| <b>Distributed Computational System</b> |   |  |   |  |                               |
|---|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60223          | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 5 or 7          | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                                | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                                | <b>Prerequisites for participation</b><br>none  |  |   |  |                               |
| <b>3</b>                                | <b>Learning outcomes</b><br><p>Able to explain the basic concepts and architecture of distributed systems</p> <p>Able to explain the components in a distributed system architecture and explain the interactions between components</p> <p>Able to explain the concept of operating system support in distributed system communication</p> <p>Able to explain the communication methods used in distributed systems and their implementation</p> <p>Able to explain coordination methods in distributed systems and their implementation</p> <p>Able to explain the principle of consistency in distributed systems and their implementation</p> <p>Able to explain the concept of system resistance to fault conditions and its implementation</p> <p>Able to implement a simple distributed system</p> |  |   |  |                               |
| <b>4</b>                                | <b>Subject aims</b><br><p>The Distributed Computing System course is an elective course that can be taken to provide insight into the concept of a distributed system including architecture, forming entities, communication and coordination methods, and methods developed to achieve a robust and reliable system. This course also trains students in implementing the concepts given in the form of a final project. Students are also given network programming skills in the project.</p>   |  |   |  |                               |
| <b>5</b>                                | <b>Teaching methods</b><br>lectures   |  |   |  |                               |
| <b>6</b>                                | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |  |   |  |                               |
| <b>7</b>                                | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |  |                               |
| <b>8</b>                                | <b>Responsibility for module</b>  |  |   |  |                               |

|   |                                  |
|---|----------------------------------|
|   | Adhitya Bhawiyuga M.Sc.          |
| 9 | <b>Other information</b><br>none |

| <b>Electronics Circuit I</b>   |  |  |   |  |                               |
|--------------------------------|--|--|---|--|-------------------------------|
| <b>module code</b><br>CCE62207 | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 2               | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>a) class  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>none   |  |   |  |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to apply electrical circuit analysis methods to electronic circuits.<br>Students are able to explain the basic theory and characteristic curves of diodes.<br>Students are able to explain the working principle of special diodes.<br>Students are able to explain the basic theory and characteristic curves of bipolar junction transistors.<br>Students are able to apply the calculation of electrical quantities in the bias circuit of a bipolar junction transistor. |  |   |  |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses the basics of electronic circuit analysis using the circuit analysis methods that have been taught, as well as the design of basic electronic circuits with passive and active components.  |  |   |  |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures  |  |   |  |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination   |  |   |  |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b>  |  |   |  |                               |

|   |   |
|---|---|
|   | Sarjana Teknik (Bachelor of Engineering)                    |
| 8 | <b>Responsibility for module</b><br>Heru Nurwarsito, M.Kom. |
| 9 | <b>Other information</b><br>none                            |

| <b>Electronics Circuit II</b> |  |                                     |   |                                  |            |
|-------------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code                   | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE61208                      | 181.33 hours   | 6                                   | Sem. 3                                  | each odd-semester                | 1 semester |
| 1                             | <b>Types of courses</b><br>a) class<br>b) practical works  | <b>contact hours</b><br>85.33 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                             | <b>Prerequisites for participation</b><br>Already taken Electronics Circuit I  |                                     |   |                                  |            |
| 3                             | <b>Learning outcomes</b><br>Students are able to apply the calculation of electrical quantities in the junction field-effect transistor bias circuit.<br>Students are able to apply the calculation of electrical quantities in metal-oxide-semiconductor field-effect transistor bias circuits.<br>Students are able to explain the working principle of the complementary metal-oxide metal oxide semiconductor and its application to basic logic gates.<br>Students are able to apply operational amplifier circuits like amplifiers, buffers, and comparators.<br>Students are able to apply the calculation of the balance of the Wheatstone bridge circuit.<br>Students are able to apply analog to digital converter circuits and calculate the conversion process.<br>Students are able to apply signal conditioning circuits according to the characteristics of the input and output systems. |                                     |   |                                  |            |
| 4                             | <b>Subject aims</b>  |                                     |   |                                  |            |

|   |   |
|---|---|
|   | This course discusses the working principle of operational amplifiers in electronic circuits and their applications in computer-based systems, as well as signal conditioning circuits used in electronic circuits. |
| 5 | <b>Teaching methods</b><br>lectures, practicum  |
| 6 | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination, competency examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |
| 8 | <b>Responsibility for module</b><br>Rizal Maulana, M.Sc.  |
| 9 | <b>Other information</b><br>none  |

| <b>Electronics Physics</b> |  |                                     |                                      |                                  |            |
|----------------------------|--|-------------------------------------|--------------------------------------|----------------------------------|------------|
| module code                | student workload   | credits (according to ECTS)         | semester                             | frequency                        | duration   |
| CCE61202                   | 58.67 hours  | 3                                   | Sem. I                               | each odd-semester                | 1 semester |
| 1                          | <b>Types of courses</b><br>a) class  | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>32 hours | <b>class size</b><br>45 students |            |
| 2                          | <b>Prerequisites for participation</b><br>none   |                                     |                                      |                                  |            |
| 3                          | <b>Learning outcomes</b><br>Students are able to explain basic quantities and derivatives used in basic electronics.<br>Students are able to distinguish the concepts of impedance, inductance, and capacitance.<br>Students are able to apply power and energy calculations in an electronic circuit.<br>Students are able to use the basic laws of electric circuits in an electronic circuit.<br>Students are able to explain the basic concepts of semiconductor theory. |                                     |                                      |                                  |            |



|   |  |
|---|--|
| 4 | <b>Subject aims</b><br>This course discusses basic physics principles related to electricity, namely quantities, passive components, power and energy, basic laws of electrical circuits and semiconductor physics theory. |
| 5 | <b>Teaching methods</b><br>lectures  |
| 6 | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |
| 8 | <b>Responsibility for module</b><br>Hurriyatul Fitriyah, M.Sc.   |
| 9 | <b>Other information</b><br>none   |

| <b>Embedded System</b>  |  |                                     |   |                                  |                        |
|-------------------------|--|-------------------------------------|---|----------------------------------|------------------------|
| module code<br>CCE62204 | student workload<br>181.33 hours   | credits<br>(according to ECTS)<br>6 | semester<br>Sem. 4                      | frequency<br>each odd-semester   | duration<br>1 semester |
| 1                       | <b>Types of courses</b><br>class, project-base, practicum  | <b>contact hours</b><br>85.33 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                        |
| 2                       | <b>Prerequisites for participation</b><br>already complete Microcontroller System course   |                                     |   |                                  |                        |
| 3                       | <b>Learning outcomes</b><br>Students are able to explain the meaning of embedded systems.<br>Students are able to apply design flow, specification, and modeling in the design of embedded systems.<br>Students are able to explain the use of computational models. |                                     |   |                                  |                        |

|   |   |
|---|---|
|   | <p>Students are able to explain the concept of scheduling and real-time operating system applications.</p> <p>Students are able to explain the design of low-power computing.</p> <p>Students are able to explain the principles of reliable system design.</p> <p>Students are able to explain evaluation, validation, and optimization in embedded systems.</p> <p>Students are able to build embedded systems according to engineering principles.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the method and design of embedded systems as well as the design and implementation in the form of a prototype which includes the characteristics of the Embedded System, Design flow, specification and modeling, computational models, scheduling, Real-Time Operating System, Low Power Computing, Reliable System Design, evaluation, and validation. , optimization</p>                           |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion, presentation</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination, project evaluation, practical-skill assessment</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Dahnial Syauqy, M.Sc.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>English Language</b> |                                 |                                     |                                  |                                |                        |
|-------------------------|---------------------------------|-------------------------------------|----------------------------------|--------------------------------|------------------------|
| module code<br>UBU60004 | student workload<br>90.67 hours | credits<br>(according to ECTS)<br>3 | semester<br>Sem. 1               | frequency<br>each odd-semester | duration<br>1 semester |
| 1                       | Types of courses<br>class       | contact hours<br>26.67 hours        | independent study<br>64.00 hours | class size<br>45 students      |                        |

|   |  |
|---|--|
| 2 | <b>Prerequisites for participation</b><br>none   |
| 3 | <b>Learning outcomes</b><br>Have the ability to understand explanations and relate information in texts in English<br>Acquire useful English vocabulary in the field of Information and Technology<br>Develop the necessary communicative skills in studying and working in the Information and Technology field             |
| 4 | <b>Subject aims</b><br>This course is designed to meet the special needs of students in the Faculty of Computer Science, Universitas Brawijaya (UB). This course is intended to help students improve their English language skills by covering topics that reflect developments in the field of information and technology. |
| 5 | <b>Teaching methods</b><br>lectures  |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)   |
| 8 | <b>Responsibility for module</b><br>Pratnyawati Nuridi Suwarso, M.Li.  |
| 9 | <b>Other information</b><br>none   |

| <b>Entrepreneurship</b> |                                  |                                     |   |                                  |            |
|-------------------------|----------------------------------|-------------------------------------|---|----------------------------------|------------|
| module code             | student workload                 | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| UBU60003                | 90.67 hours                      | 3                                   | Sem. 4                                  | each even-semester               | 1 semester |
| 1                       | <b>Types of courses</b><br>class | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |

|   |   |
|---|---|
| 2 | <p><b>Prerequisites for participation</b></p> <p>none</p>   |
| 3 | <p><b>Learning outcomes</b></p> <p>Understand the scope of entrepreneurship</p> <p>Understand the meaning of entrepreneurship as orientation</p> <p>Understand and be able to prepare business plans according to their interests</p> <p>Understanding and being able to think creatively</p> <p>Understand and have the entrepreneurial motivation</p> <p>Have knowledge and leadership spirit</p> <p>Understand and have the ability to communicate</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course provides students with an understanding of the importance of entrepreneurship as an orientation, being able to develop business plans, having creative, innovative thinking, being brave and able to calculate risk, understanding and having motivation, and having knowledge and leadership skills, and having the ability to communicate.</p>  |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Kariyoto, Dr.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Fault Tolerant Computer System</b> |   |  |   |  |                               |
|---------------------------------------|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60207        | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 6 or 8          | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                              | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                              | <b>Prerequisites for participation</b><br>none  |  |   |  |                               |
| <b>3</b>                              | <b>Learning outcomes</b><br>Students are able to explain the concept of Fault Tolerant on a computer system.<br>Students are able to analyze the nature of Fault Tolerant that exists in a computer system.<br>Students are able to design a Fault Tolerant System using the principle of Hardware Redundancy.<br>Students are able to design a Fault Tolerant System using the principle of Information Redundancy.<br>Students are able to design a Fault Tolerant System using the Time Redundancy principle.<br>Students are able to design a Fault Tolerant System using the principle of Software Redundancy. |  |   |  |                               |
| <b>4</b>                              | <b>Subject aims</b><br>This course discusses the concept and how to apply a fault tolerant system with the principle of redundancy  |  |   |  |                               |
| <b>5</b>                              | <b>Teaching methods</b><br>lectures   |  |   |  |                               |
| <b>6</b>                              | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |  |   |  |                               |
| <b>7</b>                              | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |  |                               |
| <b>8</b>                              | <b>Responsibility for module</b><br>Rakhmadhany Primananda, M.Kom.  |  |   |  |                               |
| <b>9</b>                              | <b>Other information</b><br>none  |  |   |  |                               |

| <b>FPGA Programming</b>        |  |  |   |                                       |                               |
|--------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61206 | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 3               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class, project-base   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>already complete Digital System course   |  |   |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain the basic principles of FPGA and its programming flow.<br>Students are able to build combinational circuits with FPGAs.<br>Students are able to build sequential circuits with FPGAs.<br>Students are able to use the concept of state machines in FPGA programming.<br>Students are able to use the test bench for FPGA simulation.<br>Students are able to apply the use of FPGA for digital system-based applications. |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses the digital logic design and digital system design to be implemented using FPGA   |  |   |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, discussion, presentation  |  |   |                                       |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, project evaluation  |  |   |                                       |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |  |   |                                       |                               |
| <b>8</b>                       | <b>Responsibility for module</b><br>Dahnial Syauqy, M.Sc.  |  |   |                                       |                               |
| <b>9</b>                       | <b>Other information</b><br>none   |  |   |                                       |                               |

| <b>High Performance Computer System</b> |  |  |   |  |                               |
|---|--|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60208          | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 6 or 8          | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                                | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                                | <b>Prerequisites for participation</b><br>none   |  |   |  |                               |
| <b>3</b>                                | <b>Learning outcomes</b><br>Students are able to describe the components that make up System Administration<br>Students are able to operate System Administration device management<br>Students are able to demonstrate the concept of High Performance Computer<br>Students are able to build a High Performance Computer |  |   |  |                               |
| <b>4</b>                                | <b>Subject aims</b><br>The High Performance Computer System course discusses the concept and implementation of Parallel and Cluster Computer Architecture and Organization to cloud platforms and their administration.  |  |   |  |                               |
| <b>5</b>                                | <b>Teaching methods</b><br>lectures  |  |   |  |                               |
| <b>6</b>                                | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |  |                               |
| <b>7</b>                                | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |  |   |  |                               |
| <b>8</b>                                | <b>Responsibility for module</b><br>Rakhmadhany Primananda, M.Kom.   |  |   |  |                               |
| <b>9</b>                                | <b>Other information</b><br>none   |  |   |  |                               |

| <b>Human Computer Interaction</b> |  |  |   |                                       |                               |
|-----------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE60210    | <b>student workload</b><br>90.67 hours   | <b>credits</b><br>(according to ECTS)<br>3 | <b>semester</b><br>Sem. 5 or 7          | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                          | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours        | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                          | <b>Prerequisites for participation</b><br>none   |  |   |                                       |                               |
| <b>3</b>                          | <b>Learning outcomes</b><br><p>Students are able to explain the definition of user experience (UX) and its evolution.</p> <p>Students are able to explain the physical and non-physical aspects of UXD, including concepts from the human side, computers and interactions.</p> <p>Students are able to explain common human-computer interaction models.</p> <p>Students are able to apply common guidelines and standards.</p> <p>Students are able to apply the development of human-centered computer systems, including users with special needs.</p> <p>Students are able to explain the basic principles of effective GUI design, related to applications and platforms.</p> <p>Students are able to explain the tradeoffs of developing a UX system environment.</p> <p>Students are able to apply user support in device design.</p> <p>Students are able to apply the evaluation of existing interactive systems with the criteria of Human Centered Interaction.</p> <p>Students are able to explain the role of visualization technologies in human-computer interaction.</p> <p>Students are able to explain the role of social psychology in the design of user interfaces.</p> <p>Students are able to explain the advantages and disadvantages of biometric-based systems.</p> |  |   |                                       |                               |
| <b>4</b>                          | <b>Subject aims</b><br><p>This course discusses the role and application of various design concepts for interaction between humans and computers</p>   |  |   |                                       |                               |
| <b>5</b>                          | <b>Teaching methods</b><br><p>lectures</p>   |  |   |                                       |                               |
| <b>6</b>                          | <b>Assessment methods</b>  |  |   |                                       |                               |



|   |   |
|---|---|
|   | assignment, mid-term examination, end-term examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Mochammad Hannats Hanafi Ichsan, M.T.                                       |
| 9 | <b>Other information</b><br>none  |

| <b>Indonesian Language</b> |  |                                     |   |                                  |                        |
|----------------------------|--|-------------------------------------|---|----------------------------------|------------------------|
| module code<br>MPK60007    | student workload<br>90.67 hours  | credits<br>(according to ECTS)<br>3 | semester<br>Sem. 1                      | frequency<br>each odd-semester   | duration<br>1 semester |
| 1                          | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |                        |
| 2                          | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |                        |
| 3                          | <b>Learning outcomes</b><br><p>Able to show a positive attitude and love the Indonesian language by applying it ineffective communication in the academic environment.</p> <p>Able to understand and apply various languages according to the context of use informal/non-formal communication in the scientific field.</p> <p>Able to read critically scientific texts by linking them with previous schemata and contexts.</p> <p>Able to evaluate texts in scientific and popular writings in accordance with proper grammar and spelling rules.</p> <p>Able to explore creative and innovative ideas in writing scientific or popular scientific works.</p> <p>Able to produce scientific or popular writings in a systematic, logical, and empirical manner that deserves to be published in journals and mass media.</p> |                                     |   |                                  |                        |
| 4                          | <b>Subject aims</b><br><p>Indonesian is a Personality Development Course that aims to instill the basic values of love for the homeland through the national language. In particular, understanding and applying good and correct Indonesian in academic writing in various fields of science is a means of developing</p>   |                                     |   |                                  |                        |

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|   | science and technology that must be mastered by students. The substance of this course is directed at learning Indonesian spoken and written in a systematic and logical manner through listening, reading, writing, and scientific speaking activities. On the technical aspect, this course equips students with the skills to explore ideas (content thoughts), write logically and systematically (organizational thoughts), write scientific and popular writing styles (style thoughts), and realize scientific and popular writings in their scientific field (purpose thoughts). ). In addition, the rules for scientific writing (scientific conventions) in Indonesian were also introduced which were integrated with efforts to form a scientific paradigm-based mindset. |
| 5 | <b>Teaching methods</b><br>lectures   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)  |
| 8 | <b>Responsibility for module</b><br>Mokhamad Jainuri, M.Hum.  |
| 9 | <b>Other information</b><br>none  |

| <b>Information Technology Industrial Management</b> |   |                                     |   |                                  |                        |
|---|---|-------------------------------------|---|----------------------------------|------------------------|
| module code<br>CCE60214                             | student workload<br>90.67 hours   | credits<br>(according to ECTS)<br>3 | semester<br>Sem. 5; Sem.<br>7           | frequency<br>each odd-semester   | duration<br>1 semester |
| 1   | <b>Types of courses</b><br>class  | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |                        |
| 2   | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |                        |
| 3   | <b>Learning outcomes</b><br>Students are able to apply concepts, knowledge and skills related to the basic concepts of project management |                                     |   |                                  |                        |

|   |  |
|---|--|
|   | <p>Students are able to understand human resource management</p> <p>Students are able to understand the basics of teamwork</p> <p>Students are able to understand activities, targets and achievement results from the implementation of practical expertise projects</p> <p>Students are able to understand and apply the tools needed to handle projects</p> <p>Students are able to understand quantitative and qualitative approaches to risk assessment</p> <p>Students are able to understand planning for handling unexpected events</p> <p>Students are able to understand a more detailed explanation of the topic of the project implementation team</p> <p>Students are able to demonstrate how to use the method in a sequential manner, starting from project planning, implementation, and control through case studies.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course will provide an understanding of the concept of applying the knowledge and skills that have been learned in the field of information technology to increase student competence in developing the process of a project in the information technology industry from a management point of view. Lectures are carried out with lectures, discussions and structured assignments as the application of the theory that has been obtained in lectures and evaluation in the form of assignments, Mid-Semester Exams (UTS) and Final Semester Exams (UAS).</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Nurudin Santoso, M.T.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Intelligent System Technology</b> |   |  |   |  |                               |
|--------------------------------------|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60226       | <b>student workload</b><br>90.67 hours  | <b>credits</b><br>(according to ECTS)<br>3 | <b>semester</b><br>Sem. 6; Sem. 8       | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                             | <b>Types of courses</b><br>class  | <b>contact hours</b><br>26.67 hours        | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                             | <b>Prerequisites for participation</b><br>none  |  |   |  |                               |
| <b>3</b>                             | <b>Learning outcomes</b><br><p>Students are able to explain the application of the latest technology in classification and clustering technology.</p> <p>Students are able to explain the application of the latest technology in control and control technology.</p> <p>Students are able to explain commonsense computing.</p> <p>Students are able to explain wearable computing.</p> <p>Students are able to explain the latest technology Ubiquitous Comp.</p> <p>Students are able to explain the application of the latest technology in embedded applications in the medical world.</p> <p>Students are able to explain the application of the latest technology related to state machines and low power computing.</p> |  |   |  |                               |
| <b>4</b>                             | <b>Subject aims</b><br>This course discusses the latest technology in the science of intelligent systems and smart devices with updates through paper discussions   |  |   |  |                               |
| <b>5</b>                             | <b>Teaching methods</b><br>lectures, discussion   |  |   |  |                               |
| <b>6</b>                             | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |  |   |  |                               |
| <b>7</b>                             | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |  |                               |
| <b>8</b>                             | <b>Responsibility for module</b><br>Mochammad Hannats Hanafi Ichsan, M.T.   |  |   |  |                               |

|   |                                  |
|---|----------------------------------|
| 9 | <b>Other information</b><br>none |
|---|----------------------------------|

| <b>Intelligent System</b> |  |                                     |   |                                  |            |
|---------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code               | student workload   | credits<br>(according to ECTS)      | semester                                | frequency                        | duration   |
| CCE60221                  | 136.00 hours   | 4.5                                 | Sem. 6; Sem 8                           | each even-semester               | 1 semester |
| 1                         | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                         | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                         | <b>Learning outcomes</b><br>Students are able to explain about Intelligent Agents.<br>Students are able to explain Logical Agents and their applications.<br>Students are able to explain various Searching algorithms.<br>Students are able to explain logic programming and its application.<br>Students are able to explain and design a simple Expert System.<br>Students are able to explain Fuzzy Logic and understand various fuzzy algorithms and examples of their implementation.<br>Students are able to explain the Naive-Bayes algorithm.<br>Students are able to explain artificial neural network algorithms and examples of their applications.<br>Students are able to explain about Genetic Algorithm and examples of its application. |                                     |   |                                  |            |
| 4                         | <b>Subject aims</b><br>This course discusses various things related to intelligent systems, which include intelligent agents, searching algorithms, expert systems, fuzzy logic, artificial neural networks and genetic algorithms.  |                                     |   |                                  |            |
| 5                         | <b>Teaching methods</b><br>lectures, discussion  |                                     |   |                                  |            |
| 6                         | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |                                     |   |                                  |            |

|   |   |
|---|---|
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Mochammad Hannast Hanafi Ichsan, M.T.                                       |
| 9 | <b>Other information</b><br>none  |

| <b>Introduction of Computer Science</b> |   |  |   |                                       |                               |
|---|---|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>COM60016          | <b>student workload</b><br>90.67 hours  | <b>credits</b><br>(according to ECTS)<br>3 | <b>semester</b><br>Sem. 1               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                                | <b>Types of courses</b><br>class  | <b>contact hours</b><br>26.67 hours        | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                                | <b>Prerequisites for participation</b><br>none  |  |   |                                       |                               |
| <b>3</b>                                | <b>Learning outcomes</b><br><p>Students are able to explain various clusters of computer science in relation to the basic competencies of IT graduates and literacy 4.0</p> <p>Students are able to explain about computers which include a basic understanding of hardware, software and brain ware</p> <p>Students are able to explain several computer science topics including internet, network, database, software development and security</p> <p>Students are able to apply computational thinking, critical thinking, analytical thinking and logic of informatics in several examples of computer science cases</p> <p>Students are able to apply the concept of information technology integration in the learning process using several IT uses</p> <p>Students are able to understand several trends in technology development and research in the field of computer science</p> |  |   |                                       |                               |
| <b>4</b>                                | <b>Subject aims</b>   |  |   |                                       |                               |

|   |   |
|---|---|
|   | This course is designed as a course that helps students gain insight, knowledge, and trends in technological developments as well as basic skills to prepare for learning in the field of computer science in relation to each computer science family. |
| 5 | <b>Teaching methods</b><br>lectures   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Educational)  |
| 8 | <b>Responsibility for module</b><br>Eriq Muhammad Adams Jonemaro, M.Kom.  |
| 9 | <b>Other information</b><br>none  |

| <b>Islam Religion</b> |  |                                     |   |                                  |            |
|-----------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code           | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| MPK60001              | 90.67 hours  | 3                                   | Sem. 2                                  | each even-semester               | 1 semester |
| 1                     | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |
| 2                     | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                     | <b>Learning outcomes</b><br>Believe and fear Allah SWT.<br>Guiding students to have good morals (honest, trustworthy, hard work, responsibility, and discipline).<br>Guiding students to develop correct and critical thinking and reasoning in understanding various actual problems from an Islamic perspective.<br>Respect the rights of individuals and groups by providing freedom of expression with responsibility. |                                     |   |                                  |            |

|   |   |
|---|---|
|   | Able to apply morality in everyday life, both on campus, family, and community.<br>Able to build harmonious relationships and mutual respect in diversity.  |
| 4 | <b>Subject aims</b><br>The Islamic Religion course is a Personality Development Course (MPK) which examines Islamic teachings as a source of values and guidelines that lead students to develop Islamic professions and personalities. After following the Islamic Religion course, students can develop their faith and piety, have knowledge and have a noble character, and make Islamic teachings the basis for thinking and behaving in professional development. |
| 5 | <b>Teaching methods</b><br>lectures   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)  |
| 8 | <b>Responsibility for module</b><br>Khalid Rahman, M.Pd.I.  |
| 9 | <b>Other information</b><br>none  |

| <b>Latest Network Architecture</b> |   |                                       |   |                                  |                        |
|------------------------------------|---|---------------------------------------|---|----------------------------------|------------------------|
| module code<br>CCE60205            | student workload<br>136.00 hours  | credits<br>(according to ECTS)<br>4.5 | semester<br>Sem. 4                      | frequency<br>each even-semester  | duration<br>1 semester |
| 1                                  | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                        |
| 2                                  | <b>Prerequisites for participation</b><br>Linear System   |                                       |   |                                  |                        |
| 3                                  | <b>Learning outcomes</b><br>Students are able to explain the basic concepts of one of the latest network technologies |                                       |   |                                  |                        |



|   |   |
|---|---|
|   | <p>Students are able to explain the architecture of one of the latest network technologies</p> <p>Students are able to explain the communication mechanism between the components that make up the system</p> <p>Students are able to explain the interaction between the components that make up the system</p> <p>Students are able to identify research issues related to the latest network technology that is being discussed in lectures</p> <p>Students are able to design a final project related to the latest network technology that is being discussed in lectures.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the latest topics and technologies in the field of computer networks including basic concepts, architecture, constituent components, and the interactions between each component as well as related research issues.</p>  |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Achmad Basuki, Ph.D.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Linier System</b>           |   |  |   |                                       |                               |
|--------------------------------|---|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61211 | <b>student workload</b><br>136.00 hours | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 3               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class        | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b>  |  |   |                                       |                               |

|          |  |
|----------|--|
|          | none   |
| <b>3</b> | <p><b>Learning outcomes</b></p> <p>Students are able to explain the basics of signals and systems.</p> <p>Students are able to calculate the total response of a system.</p> <p>Students are able to calculate the Impulse response of a system.</p> <p>Students are able to calculate convolutions.</p> <p>Students are able to calculate the Laplace Transform.</p> <p>Students are able to calculate Response Frequency.</p> <p>Students are able to calculate the Fourier Transform.</p> <p>Students are able to find Pole and Zero.</p> <p>Students are able to find linear differential equations.</p> |
| <b>4</b> | <p><b>Subject aims</b></p> <p>This course discusses signal, impulse response, frequency response, frequency response and the application of convolution, Laplace transform, Fourier transform, linear differential equation.</p>   |
| <b>5</b> | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>   |
| <b>6</b> | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>   |
| <b>7</b> | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| <b>8</b> | <p><b>Responsibility for module</b></p> <p>Hurriyatul Fitriyah, M.Sc.</p>  |
| <b>9</b> | <p><b>Other information</b></p> <p>none</p>  |

| <b>Microcontroller System</b>  |  |  |   |                                       |                               |
|--------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE61212 | <b>student workload</b><br>181.33 hours  | <b>credits</b><br>(according to ECTS)<br>6 | <b>semester</b><br>Sem. 3               | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class, project-base, practicum  | <b>contact hours</b><br>85.33 hours        | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>already complete Digital System course   |  |   |                                       |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br><p>Students are able to explain the meaning of microcontroller, microcontroller architecture, and microcontroller functions.</p> <p>Students are able to explain the memory organization of a microcontroller system.</p> <p>Students are able to create programs to access General I/O.</p> <p>Students are able to explain the interrupt system on the microcontroller and are able to make programs to run interrupts on the microcontroller.</p> <p>Students are able to explain the timer and counter system on the microcontroller and are able to make programs to run the timer and counter on the microcontroller.</p> <p>Students are able to explain serial communication on a microcontroller and are able to make programs to run serial communication on a microcontroller.</p> <p>Students are able to explain several kinds of microcontroller platforms.</p> <p>Students are able to design and create applications using a microcontroller system.</p> |  |   |                                       |                               |
| <b>4</b>                       | <b>Subject aims</b><br><p>This course explains microcontrollers and their architecture, as well as applying low and high-level programming to design interfaces to memory, serial ports, parallel ports, use of interrupts and timers, and counters.</p>   |  |   |                                       |                               |
| <b>5</b>                       | <b>Teaching methods</b><br><p>lectures, discussion, presentation</p>   |  |   |                                       |                               |
| <b>6</b>                       | <b>Assessment methods</b><br><p>assignment, mid-term examination, end-term examination, project evaluation, practical-skill assessment</p>   |  |   |                                       |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b>  |  |   |                                       |                               |

|   |  |
|---|--|
|   | Sarjana Teknik (Bachelor of Engineering)                   |
| 8 | <b>Responsibility for module</b><br>Agung Setia Budi, Ph.D |
| 9 | <b>Other information</b><br>none                           |

| <b>Mobile Device</b> |   |                                     |   |                                  |            |
|----------------------|---|-------------------------------------|---|----------------------------------|------------|
| module code          | student workload  | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60220             | 90.67 hours   | 3                                   | Sem. 6; Sem. 8                          | each even-semester               | 1 semester |
| 1                    | <b>Types of courses</b><br>class  | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |
| 2                    | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |            |
| 3                    | <b>Learning outcomes</b><br>Students are able to explain the development of mobile device technology.<br>Students are able to explain various hardware on mobile devices.<br>Students are able to explain various software on mobile devices.<br>Students are able to apply the basic concepts of mobile device programming.<br>Students are able to apply programming for mobile device data acquisition.<br>Students are able to apply programming to store data. |                                     |   |                                  |            |
| 4                    | <b>Subject aims</b><br>This course discusses various things related to mobile devices, both technology, hardware and software, as well as various programming related to data acquisition and simple processing.  |                                     |   |                                  |            |
| 5                    | <b>Teaching methods</b><br>lectures, discussion   |                                     |   |                                  |            |
| 6                    | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |                                     |   |                                  |            |
| 7                    | <b>This module is used in the following degree programs as well</b>   |                                     |   |                                  |            |

|   |   |
|---|---|
|   | Sarjana Teknik (Bachelor of Engineering)                  |
| 8 | <b>Responsibility for module</b><br>Dahnial Syauqy, M.Sc. |
| 9 | <b>Other information</b><br>none                          |

| <b>Mobile Robot Programming</b> |  |                                     |   |                                  |            |
|---------------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code                     | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60217                        | 136.00 hours   | 4.5                                 | Sem. 6 or 8                             | each even-semester               | 1 semester |
| 1                               | <b>Types of courses</b><br>class, final-project  | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                               | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                               | <b>Learning outcomes</b><br>Students are able to understand the design and structure of wheeled robots<br>Students are able to explain the algorithm for determining the location and navigation of the robot<br>Students are able to explain maze exploration<br>Students are able to explain mapping<br>Students are able to explain communication methods between robots<br>Students are able to demonstrate a wheeled robot simulation |                                     |   |                                  |            |
| 4                               | <b>Subject aims</b><br>This course discusses various algorithms related to the development of wheeled robots, which include location determination, maze exploration, mapping, communication and simulation.   |                                     |   |                                  |            |
| 5                               | <b>Teaching methods</b><br>lectures, project-based   |                                     |   |                                  |            |
| 6                               | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination, project assessment   |                                     |   |                                  |            |
| 7                               | <b>This module is used in the following degree programs as well</b>  |                                     |   |                                  |            |

|   |   |
|---|---|
|   | Sarjana Teknik (Bachelor of Engineering)                  |
| 8 | <b>Responsibility for module</b><br>Dahnial Syauqy, M.Sc. |
| 9 | <b>Other information</b><br>none                          |

| <b>Numerical Methods</b> |   |                                       |   |                                  |                           |
|--------------------------|---|---------------------------------------|---|----------------------------------|---------------------------|
| module code<br>CCE60215  | student workload<br>136 hours   | credits<br>(according to ECTS)<br>4.5 | semester<br>6. Sem, 8 Sem.              | frequency<br>each even-semester  | duration<br>1 semester(s) |
| 1                        | <b>Types of courses</b><br>class, case-study  | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                           |
| 2                        | <b>Prerequisites for participation</b><br>none  |                                       |   |                                  |                           |
| 3                        | <b>Learning outcomes</b><br>Students are able to understand numerical concepts in solving mathematical problems and describe errors in numerical methods.<br><br>Students are capable of calculating numerical methods including roots of non-linear equations, systems of linear equations, values and eigenvectors, forecasting using regression and interpolation, integration, differentiation, and optimization.<br><br>Students are able to apply the concept of numerical methods in the form of program code. |                                       |   |                                  |                           |
| 4                        | <b>Subject aims</b><br>Numerical method is a compulsory subject that provides knowledge about numerical mathematical problems. The numerical approach supports the use of computers to solve mathematical problems using a programming language. In some mathematical problems, making computer programs using analytical methods is very difficult to do.  |                                       |   |                                  |                           |
| 5                        | <b>Teaching methods</b><br>lectures, discussion   |                                       |   |                                  |                           |

|   |   |
|---|---|
| 6 | <b>Assessment methods</b><br>assignment, quizzes, mid-term examination, end-term examination                    |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Agung Setia Budi, Ph.D.   |
| 9 | <b>Other information</b><br>none  |

| <b>Operating System</b> |  |                                     |   |                                  |            |
|-------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code             | student workload   | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE62209                | 181.33 hours   | 6                                   | Sem. 4                                  | each even-semester               | 1 semester |
| 1                       | <b>Types of courses</b><br>class, practicum  | <b>contact hours</b><br>85.33 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                       | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                       | <b>Learning outcomes</b><br>Students are able to explain the basic concepts of operating systems.<br>Students are able to explain the structure of the operating system.<br>Students are able to explain the concept of the process.<br>Students are able to explain the concept of thread.<br>Students are able to explain synchronization techniques between processes.<br>Students are able to explain CPU scheduling in completing many processes.<br>Students are able to explain the concept of deadlocks.<br>Students are able to explain main memory management and its implementation.<br>Students are able to explain the types and management of storage devices.<br>Students are able to explain the file system interface and its implementation. |                                     |   |                                  |            |

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|   | Students are able to explain the structure of the I/O system.  |
| 4 | <b>Subject aims</b><br>This course discusses the concepts and working principles of operating systems in the process of managing resources, establishing and executing programs and processes, coordinating hardware components, managing interactions between users and applications and hardware, manipulating file systems to managing the use of storage media and input devices. and other outputs. |
| 5 | <b>Teaching methods</b><br>lectures  |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer)   |
| 8 | <b>Responsibility for module</b><br>Adhitya Bhawiyuga, M.Sc.   |
| 9 | <b>Other information</b><br>none   |

| <b>Pancasila</b> |  |                                     |   |                                  |            |
|------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code      | student workload   | credits<br>(according to ECTS)      | semester                                | frequency                        | duration   |
| MPK60008         | 90.67 hours  | 3                                   | Sem. 4                                  | each even-semester               | 1 semester |
| 1                | <b>Types of courses</b><br>class   | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |
| 2                | <b>Prerequisites for participation</b><br>none   |                                     |   |                                  |            |
| 3                | <b>Learning outcomes</b><br>Analyze, compare, and reflect on the function and important position of Pancasila in the history of the nation.<br>Able to analyze the relationship between the philosophical nature of the values of the Pancasila precepts and use it as a knife to analyze the nation's problems. |                                     |   |                                  |            |



|   |   |
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|   | <p>Able to show a positive attitude and love the ideology of the Indonesian nation by applying the values of Pancasila in the academic environment.</p> <p>Able to understand, identify, and account for the analysis of laws and policies that are idealistic, practical, and pragmatic based on Pancasila.</p> <p>Able to build awareness of critical and innovative thinking in the development of science and technology-based on Pancasila values.</p>   |
| 4 | <p><b>Subject aims</b></p> <p>The Pancasila Course is a national compulsory subject that is included in the personality development course group with a weight of 2 credits. This course is required with the following backgrounds:</p> <p>Historicity; as a nation that respects history, the life of the nation and state is never separated from the values that have been instilled by the founding fathers.</p> <p>Cultural; As a nation that has cultural roots and values, we must have a solid cultural foundation so that our national identity will not be swallowed up by the times.</p> <p>Juridical; In the statutes of Universitas Brawijaya, it is stated the need to preserve the values of Pancasila.</p> <p>In the Global Era, various world ideologies that enter our lives can affect our views on the life of the nation and state, even threaten the division of the nation, so a philosophical basis is needed for the State.</p> |
| 5 | <p><b>Teaching methods</b></p> <p>lectures</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Afrizal Mukti Wibowo, M.H.</p>   |
| 9 | <p><b>Other information</b></p> <p>none</p>   |

| <b>Parallel Processing</b>     |   |  |   |  |                               |
|--------------------------------|---|--|---|--|-------------------------------|
| <b>module code</b><br>CCE60218 | <b>student workload</b><br>136.00 hours   | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 6 or 8          | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class, project-based   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>have taken Computer Architecture and Organization course  |  |   |  |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain the basic concepts of parallel processing.<br>Students are able to design or create a platform or program that runs a parallel processing.<br>Students are able to apply several kinds of basic algorithms that are often used in parallel processing. |  |   |  |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses the concept and application of parallel processing and related popular algorithms  |  |   |  |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures   |  |   |  |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, project examination  |  |   |  |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)   |  |   |  |                               |
| <b>8</b>                       | <b>Responsibility for module</b><br>Agung Setia Budi, Ph.D  |  |   |  |                               |
| <b>9</b>                       | <b>Other information</b><br>none  |  |   |  |                               |

| <b>Pattern Recognition System</b> |  |  |   |                                       |                               |
|-----------------------------------|--|--|---|---------------------------------------|-------------------------------|
| <b>module code</b><br>CCE60225    | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 5; Sem<br>7     | <b>frequency</b><br>each odd-semester | <b>duration</b><br>1 semester |
| <b>1</b>                          | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students      |                               |
| <b>2</b>                          | <b>Prerequisites for participation</b><br>none   |  |   |                                       |                               |
| <b>3</b>                          | <b>Learning outcomes</b><br><p>Students are able to understand the basics of Pattern Recognition.</p> <p>Students are able to apply Bayes theorem.</p> <p>Students are able to apply Naive Bayes.</p> <p>Students are able to apply K-Nearest Neighbor.</p> <p>Students are able to apply the Support Vector Machine.</p> <p>Students are able to apply Artificial Neural Networks.</p> <p>Students are able to apply K-Means.</p> <p>Students are able to apply AHC.</p> <p>Students are able to apply Linear Regression.</p> <p>Students are able to apply Principal Component Analysis.</p> <p>Students are able to apply Chi Square.</p> |  |   |                                       |                               |
| <b>4</b>                          | <b>Subject aims</b><br>This course discusses various popular algorithms used to recognize patterns in data.  |  |   |                                       |                               |
| <b>5</b>                          | <b>Teaching methods</b><br>lectures, discussion  |  |   |                                       |                               |
| <b>6</b>                          | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |                                       |                               |
| <b>7</b>                          | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering)  |  |   |                                       |                               |
| <b>8</b>                          | <b>Responsibility for module</b><br>Dahnial Syauqy, M.Sc.  |  |   |                                       |                               |

|   |                                  |
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| 9 | <b>Other information</b><br>none |
|---|----------------------------------|

| <b>Professional Ethics</b> |   |                                     |   |                                  |            |
|----------------------------|---|-------------------------------------|---|----------------------------------|------------|
| module code                | student workload  | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| COM60052                   | 90.67 hours   | 3                                   | Sem. 5                                  | each odd-semester                | 1 semester |
| 1                          | <b>Types of courses</b><br>class, study-case  | <b>contact hours</b><br>26.67 hours | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |            |
| 2                          | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |            |
| 3                          | <b>Learning outcomes</b><br>Able to understand the meaning and purpose of ethics and professional ethics in the field of Information and Communication Technology (ICT)<br>Able to understand the history and background of the need for ethics in the field of ICT<br>Able to distinguish the meaning of work, profession, and professionalism<br>Able to distinguish the types of professions in the ICT field in general and in particular<br>Able to distinguish the types of professional roles of ICT educators<br>Able to understand increasing professionalism in the field of ICT<br>Able to know and understand the professional code of ethics in the field of ICT and professional organizations in the field of ICT<br>Able to understand cybercrime problems and solutions in professional ethics in the field of ICT<br>Able to understand the need for business ethics in the field of ICT such as e-commerce<br>Able to know and understand the Copyright Law as part of the protection of initiatives, findings, and innovations in the context of strengthening professional ethics<br>Able to understand plagiarism which is a challenge of professional ethics in the field of ICT both academic and non-academic<br>Able to understand and use free and licensed software as a reward for innovative work |                                     |   |                                  |            |
| 4                          | <b>Subject aims</b>   |                                     |   |                                  |            |

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|   | Professional ethics is a course that discusses the need for ethics in the field of Information and Communication Technology (ICT) and professional improvement so that the implementation of ICT can be carried out in a professional manner based on the code of ethics and applicable laws and regulations. |
| 5 | <b>Teaching methods</b><br>lectures   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer), Sarjana Pendidikan (Bachelor of Education)  |
| 8 | <b>Responsibility for module</b><br>Denny Sagita Rusdianto, M.Kom.  |
| 9 | <b>Other information</b><br>none  |

| <b>Research Methodology and Scientific Writing</b> |   |                                       |   |                                  |                        |
|--|---|---------------------------------------|---|----------------------------------|------------------------|
| module code<br>COM60051                            | student workload<br>136.00 hours  | credits<br>(according to ECTS)<br>4.5 | semester<br>Sem. 5                      | frequency<br>each odd-semester   | duration<br>1 semester |
| 1  | <b>Types of courses</b><br>class, project-based   | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                        |
| 2  | <b>Prerequisites for participation</b><br>have already completed 60 credits (90 ECTS)   |                                       |   |                                  |                        |
| 3  | <b>Learning outcomes</b><br>Able to carry out the process of self-evaluation and able to manage research independently<br>Able to document, store, secure, and rediscover research data to ensure the validity of research and prevent plagiarism<br>Able to disseminate academic work in the form of scientific publications uploaded on the website of universities and/or reputable journals |                                       |   |                                  |                        |

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| 4 | <b>Subject aims</b><br>This course will explore, direct, and grow students' curiosity in scientific thinking methods in order to try to answer their curiosity (curiosity-driven) or solve problems (problem-driven) or prove their hypothesis (hypothesis-driven) in the field of Information Technology and put it in the form of scientific documents. |
| 5 | <b>Teaching methods</b><br>lectures, discussion   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, project examination  |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering), Sarjana Komputer (Bachelor of Computer) Sarjana Pendidikan (Bachelor of Education)   |
| 8 | <b>Responsibility for module</b><br>Edita Rosana Widasari, Ph.D.  |
| 9 | <b>Other information</b><br>none  |

| <b>Robotics Kinematics</b> |   |                                     |   |                                  |            |
|----------------------------|---|-------------------------------------|---|----------------------------------|------------|
| module code                | student workload  | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60212                   | 136.00 hours  | 4.5                                 | Sem. 5 or 7                             | each odd-semester                | 1 semester |
| 1                          | <b>Types of courses</b><br>class, final-project   | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                          | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |            |
| 3                          | <b>Learning outcomes</b><br>Students are able to explain the parts and functions of several types of manipulator robots.<br>Students are able to explain the concept of the coordinate system in the movement of the manipulator robot. |                                     |   |                                  |            |

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|   | <p>Students are able to explain the concept of matrix transformation on the movement of the manipulator robot.</p> <p>Students are able to apply the forward kinematics method to the movement of the manipulator robot arm.</p> <p>Students are able to apply the inverse kinematics method to the movement of the manipulator robot arm.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the design and kinematics calculations on manipulator robots</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, project-based</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, quizzes, mid-term examination, end-term examination, project assessment</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Rizal Maulana, M.Sc.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Sensor and Actuator</b> |   |                                       |   |                                  |                 |
|----------------------------|---|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>         | <b>student workload</b>   | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE62208                   | 90.67 hours   | 3                                     | Sem. 4                                  | each even-semester               | 1 semester      |
| 1                          | <b>Types of courses</b><br>class, case-study  | <b>contact hours</b><br>26.67 hours   | <b>independent study</b><br>64.00 hours | <b>class size</b><br>45 students |                 |
| 2                          | <b>Prerequisites for participation</b><br>none  |                                       |   |                                  |                 |
| 3                          | <b>Learning outcomes</b><br>Students are able to explain the basic principles of measurement. |                                       |   |                                  |                 |

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|   | <p>Students are able to calculate simple calibrations in measurements.</p> <p>Students are able to explain various classifications and characteristics of sensors.</p> <p>Students are able to explain various types of sensors for specific uses and also the principle of reading them.</p> <p>Students are able to calculate the basic processing of sensor reading data.</p> <p>Students are able to apply signal conditioning circuits and ADC.</p> <p>Students are able to explain actuators and their characteristics.</p> <p>Students are able to explain the principle of actuation of various DC motors.</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the basic concepts of measurement, sensor classification and characteristics, data processing, analog to digital conversion, and signal conditioning from sensor readings as well as the basic mechanism of actuators for various types of DC motors.</p>  |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>   |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, quizzes, mid-term examination, end-term examination</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>   |
| 8 | <p><b>Responsibility for module</b></p> <p>Rizal Maulana, M.Sc.</p>  |
| 9 | <p><b>Other information</b></p> <p>none</p>  |

| <b>Server System Administration</b> |  |                                     |   |                                  |            |
|-------------------------------------|--|-------------------------------------|---|----------------------------------|------------|
| module code                         | student workload                             | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60202                            | 136.00 hours                                 | 4.5                                 | Sem. 5 or 7                             | each odd-semester                | 1 semester |
| 1                                   | <b>Types of courses</b><br>class, case-based | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |



|   |   |
|---|---|
| 2 | <p><b>Prerequisites for participation</b></p> <p>have already taken a Computer Networking course</p>  |
| 3 | <p><b>Learning outcomes</b></p> <p>Students are able to explain the basic concepts of server system administration</p> <p>Students are able to demonstrate the ability to apply basic Unix/Linux commands</p> <p>Students are able to demonstrate the ability to manage infrastructure based on virtual machines</p> <p>Students are able to demonstrate the ability to manage storage servers</p> <p>Students are able to demonstrate DNS management skills</p> <p>Students are able to demonstrate the ability to manage web technology development services (web stack)</p> <p>Students are able to demonstrate the ability to manage container-based virtual machines</p> <p>Students are able to demonstrate the ability to manage the orchestration mechanism of container-based virtual machines</p> <p>Students are able to apply high availability and fault tolerance strategies in server management</p> <p>Students are able to implement a monitoring mechanism and guarantee the security of services that run on a server</p> <p>Students are able to design server management that meets the rules of functionality, high availability, fault tolerance, and security in a case study</p> |
| 4 | <p><b>Subject aims</b></p> <p>This course discusses the basic concepts and implementation of various mechanisms for managing a server system including basic Unix/Linux commands, virtualization technology, storage device management, DNS service management and the web stack, container-based virtualization technology, availability assurance strategies. (high-availability) and fault tolerance as well as monitoring and monitoring mechanisms</p>   |
| 5 | <p><b>Teaching methods</b></p> <p>lectures, discussion</p>  |
| 6 | <p><b>Assessment methods</b></p> <p>assignment, mid-term examination, end-term examination, participation evaluation</p>  |
| 7 | <p><b>This module is used in the following degree programs as well</b></p> <p>Sarjana Teknik (Bachelor of Engineering)</p>  |
| 8 | <p><b>Responsibility for module</b></p> <p>Adhitya Bhawiyuga, M.Sc.</p>   |
| 9 | <p><b>Other information</b></p>   |

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|------|
| none |
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| <b>Signal Processing</b>       |  |  |   |  |                               |
|--------------------------------|--|--|---|--|-------------------------------|
| <b>module code</b><br>CCE62206 | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 4               | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| <b>1</b>                       | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>Linear System  |  |   |  |                               |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain discrete signals.<br>Students are able to Calculate Sampling and Aliasing, Analog to Digital Conversion, Discrete Signal Operations<br>Students are able to explain discrete systems.<br>Students are able to explain the LTI system.<br>Students are able to calculate discrete convolutions.<br>Students are able to explain digital spectrum analysis.<br>Students are able to Calculate Z Transformation.<br>Students are able to calculate DFS, DFT, FFT, FIR, IIR.<br>Students are able to explain digital filters. |  |   |  |                               |
| <b>4</b>                       | <b>Subject aims</b><br>This course provides a basic understanding of the transformation, synthesis, and analysis of data in digital signal processing for use in computer-based systems.   |  |   |  |                               |
| <b>5</b>                       | <b>Teaching methods</b><br>lectures, discussion  |  |   |  |                               |
| <b>6</b>                       | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |  |                               |
| <b>7</b>                       | <b>This module is used in the following degree programs as well</b>  |  |   |  |                               |

|   |  |
|---|--|
|   | Sarjana Teknik (Bachelor of Engineering)                       |
| 8 | <b>Responsibility for module</b><br>Hurriyatul Fitriyah, M.Sc. |
| 9 | <b>Other information</b><br>none                               |

| <b>Statistics</b>              |  |  |   |  |                               |
|--------------------------------|--|--|---|--|-------------------------------|
| <b>module code</b><br>CCE62210 | <b>student workload</b><br>136.00 hours  | <b>credits</b><br>(according to ECTS)<br>4.5 | <b>semester</b><br>Sem. 2               | <b>frequency</b><br>each even-semester | <b>duration</b><br>1 semester |
| 1                              | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours          | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students       |                               |
| 2                              | <b>Prerequisites for participation</b><br>none   |  |   |  |                               |
| 3                              | <b>Learning outcomes</b><br>Students are able to understand and calculate descriptive statistical concepts.<br>Students are able to understand and calculate probability and random variables.<br>Students are able to understand and calculate the concept of sampling, sampling distribution, and parameter estimation.<br>Students are able to understand and demonstrate hypothesis testing.<br>Students are able to understand and calculate the concept of regression and correlation. |  |   |  |                               |
| 4                              | <b>Subject aims</b><br>This course discusses probability, statistics, sampling, regression and their role in computer science  |  |   |  |                               |
| 5                              | <b>Teaching methods</b><br>lectures, discussion  |  |   |  |                               |
| 6                              | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |  |   |  |                               |
| 7                              | <b>This module is used in the following degree programs as well</b>  |  |   |  |                               |

|   |   |
|---|---|
|   | Sarjana Teknik (Bachelor of Engineering)        |
| 8 | <b>Responsibility for module</b><br>Marji, M.T. |
| 9 | <b>Other information</b><br>none                |

| <b>Voice Processing</b> |   |                                     |   |                                  |            |
|-------------------------|---|-------------------------------------|---|----------------------------------|------------|
| module code             | student workload  | credits (according to ECTS)         | semester                                | frequency                        | duration   |
| CCE60219                | 136.00 hours  | 4.5                                 | Sem. 5; Sem 7                           | each odd-semester                | 1 semester |
| 1                       | <b>Types of courses</b><br>class  | <b>contact hours</b><br>40.00 hours | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |            |
| 2                       | <b>Prerequisites for participation</b><br>none  |                                     |   |                                  |            |
| 3                       | <b>Learning outcomes</b><br>Students are able to explain audio and sound signals.<br>Students describe the process of digitizing voice signals.<br>Students are able to describe the feature vector of sound signals.<br>Students are able to explain system estimation and system identification using Linear Predictive Coding.<br>Students are able to explain and determine the shape of sound accurately using Mel Frequency Cepstral Coefficients.<br>Students are able to explain Gaussian Mixture Models.<br>Students are able to explain HMM Models in speech recognition. |                                     |   |                                  |            |
| 4                       | <b>Subject aims</b><br>This course discusses how to digitally process voice signal processing techniques through computer systems.  |                                     |   |                                  |            |
| 5                       | <b>Teaching methods</b><br>lectures, discussion   |                                     |   |                                  |            |

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|---|---|
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination                             |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Fitri Utaminingrum, Dr.Eng.   |
| 9 | <b>Other information</b><br>none  |

| <b>Web Application Programming</b> |  |                                       |   |                                  |                 |
|------------------------------------|--|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>                 | <b>student workload</b>  | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE60216                           | 136.00 hours   | 4.5                                   | Sem. 6; Sem. 8                          | each even-semester               | 1 semester      |
| 1                                  | <b>Types of courses</b><br>class   | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| 2                                  | <b>Prerequisites for participation</b><br>Basic Programming  |                                       |   |                                  |                 |
| 3                                  | <b>Learning outcomes</b><br>Students are able to explain the basic principles of dynamic web, server-side scripting, file-directory, and security techniques.<br>Students are able to apply iteration, use of databases, MVC, frameworks and XML in web development. |                                       |   |                                  |                 |
| 4                                  | <b>Subject aims</b><br>This course discusses web programming which includes the basic principles of dynamic web, server-side scripting, file-directory, security techniques, looping, database usage, MVC, framework and XML in web development.                     |                                       |   |                                  |                 |
| 5                                  | <b>Teaching methods</b><br>lectures, discussion  |                                       |   |                                  |                 |
| 6                                  | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination  |                                       |   |                                  |                 |

|   |   |
|---|---|
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Agi Putra Kharisma, M.T.  |
| 9 | <b>Other information</b><br>none  |

| <b>Wireless Sensor Network</b> |   |                                       |   |                                  |                 |
|--------------------------------|---|---------------------------------------|---|----------------------------------|-----------------|
| <b>module code</b>             | <b>student workload</b>   | <b>credits</b><br>(according to ECTS) | <b>semester</b>                         | <b>frequency</b>                 | <b>duration</b> |
| CCE60227                       | 136.00 hours  | 4.5                                   | Sem. 6 or 8                             | each even-semester               | 1 semester      |
| <b>1</b>                       | <b>Types of courses</b><br>class, case-based  | <b>contact hours</b><br>40.00 hours   | <b>independent study</b><br>96.00 hours | <b>class size</b><br>45 students |                 |
| <b>2</b>                       | <b>Prerequisites for participation</b><br>have already taken a Data Communication course  |                                       |   |                                  |                 |
| <b>3</b>                       | <b>Learning outcomes</b><br>Students are able to explain the basic concepts and applications of WSN.<br>Students are able to explain the sensor node architecture on WSN.<br>Students are able to explain the concepts and uses of operating systems on sensor nodes.<br>Students are able to explain the MAC concept on Wireless Sensor Network.<br>Students are able to explain and use WSN communication devices.<br>Students are able to explain the concept of Addressing & Routing WSN.<br>Students are able to explain the concept of 6LoWPAN.<br>Students are able to explain the Time Synchronization Technique on WSN.<br>Students are able to explain the concept of power management in WSN.<br>Students are able to explain the concept of localization and node placement on WSN. |                                       |   |                                  |                 |
| <b>4</b>                       | <b>Subject aims</b><br>This course discusses architecture, communication, and various technologies related to wireless sensor nodes   |                                       |   |                                  |                 |

|   |   |
|---|---|
| 5 | <b>Teaching methods</b><br>lectures, discussion   |
| 6 | <b>Assessment methods</b><br>assignment, mid-term examination, end-term examination, participation evaluation   |
| 7 | <b>This module is used in the following degree programs as well</b><br>Sarjana Teknik (Bachelor of Engineering) |
| 8 | <b>Responsibility for module</b><br>Rakhmadhany Primananda, M.Kom.  |
| 9 | <b>Other information</b><br>none  |