

# Programme Specification Bachelor in Informatics

## Faculty of Information Technology - ITS

### Curriculum 2014 - 2019

This specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes advantage of the learning opportunities that are provided. More detail on the specific learning outcomes, indicative content and the teaching, learning and assessment methods of each module can be found (1) at Informatics Department website (<http://if.its.ac.id>), (2) in the Informatics Department Curriculum, and (3) in the Catalog and Syllabus.

The accuracy of the information contained in this document is reviewed by the University and may be checked within independent review processes undertaken by the Quality Assurance Agency (Pusat Jaminan Mutu, LPMP2KI ITS).

<b>Awarding Institution/Body:</b>	Institut Teknologi Sepuluh Nopember
<b>Teaching Institution:</b>	Institut Teknologi Sepuluh Nopember
<b>Interim Awards and Final Award:</b>	Bachelor in Computer Science
<b>Programme Title</b>	Informatics
<b>Main Field of Study</b>	Computer Science, Mathematics, Statistics, Digital Electronics, Software Engineering, Intelligent Computing and Vision, Graphics, and Net-Centric Computing.
<b>Modes of Study</b>	Full-Time Sandwich
<b>Language of Study</b>	Bahasa English
<b>Accreditation</b>	Higher Education National Accreditation Council (BAN-PT), Ministry of Education (Last accreditation in 2011, Score A)

Relevant subject benchmark statements and other external reference points used to inform programme outcomes:

- Higher Education Directorate General, Ministry of Education, Indonesia
- QA Center, ITS
- Guideline from the Association for Computing Machinery (ACM), the core curriculum framework
- IT career analysis from Association of Informatics and Computer University (Asosiasi Perguruan Tinggi Informatika dan Ilmu Komputer, APTIKOM-Indonesia)

#### Programme philosophy and aims

The Bachelor in Informatics programme will produce graduates with highly developed skills in producing computer-based solutions for real world problem, who will have the technical and management capability required by employers in a rapidly changing technological landscape. The curriculum considers

the guideline from the Association for Computing Machinery (ACM), the core curriculum framework and IT career analysis from Association of Informatics and Computer University (Asosiasi Perguruan Tinggi Informatika dan Ilmu Komputer, APTIKOM-Indonesia) as well as feedbacks from the stakeholder, especially from the industry. Specialization is by way of pathways, option modules and research-focused group project work, giving students the chance to make an informed choice of their future career direction. The pathways initially available offer specialism in basic and applied computation, intelligent computing and vision, interactive graphics and art, software engineering, information management, net-centric computing, and architecture computer network.

Employing option modules in the course structure allows topics and themes to be introduced or modified according to changing requirements from industry. The programme has outcomes relating to advanced study and industry awareness, with significant involvement in group-work in assignments and design projects.

These activities will help students develop in areas such as planning and decision making, acting independently, accepting responsibilities, formulating ideas proactively, developing strategies, implementing and executing agreed plans, leading and managing teams, and evaluating achievement against specification. The department has close links with major employers in the region to enhance the students learning experience through case studies, projects and industrial placements.

The aims of the programme are to:

- provide a stimulating and rewarding learning experience by way of scheduled lectures, labs, tutorials, seminars and support for related extra-curricular activity;
- develop knowledge, analytical and practical capability in engineering fundamentals, computer and computing principles, multivariate data analysis, data mining, computational intelligence, discrete system simulation, data warehousing, digital image processing, computer simulation and game, information retrieval, computer vision, nonlinear optimization, robot programming, wireless networks and mobile computing; network securities, distributed systems, inter networks technology, multimedia networks, grid computing, network design and management, compression techniques, computer animation, it audit and it governance, software project management, software verification and validation, software evolution, game development, software patterns and architectures, mobile devices programming, and virtual reality.
- build an understanding of commercial, legal, ethical and environmental factors associated with computer science;
- encourage the development of transferable and key skills applicable to employment and continuing professional development;
- lay a foundation for further study;

<b>EXPECTED LEARNING OUTCOME</b>		
<b>Hard Skills</b>	1.1	Able to systematically identify, analyze, and solve a problem in the domain of IT
	1.2	Able to apply the Information Technology knowledge and skill in order to create jobs (technopreneur skill)
<b>Knowledge</b>	2.1	Mastering knowledge and skills of informatics, which includes basic concept, theory, and application of computer science, intelligent computation and visualization, software engineering, and net-centric computing
	2.2	Able to solve computation, network, and software engineering problems.
<b>Managerial Skills</b>	3.1	Able to analyze, plan, manage, evaluate, and communicate information resources
	3.2	Able to provide alternative solutions through leadership, creativity, and communication skills
	3.3	Responsible on his/her own tasks with regard to organization's key performance indexes
<b>Attitude and Values</b>	4.1	Respect and obey a supreme being.
	4.2	Have a good personality and professional ethics.
	4.3	Take active participation as proud citizen and promotes world peace
	4.4	Able to work in team and have social awareness with respect to the community and environment
	4.5	Respect variety with respect to cultures, believes, and religions, and original idea/opinion of others
	4.6	Respect law enforcement and put public/nation interest above personal interest
	4.7	Have a good language literacies.

Learning teaching, and assessment methods used Knowledge and understanding are acquired through a variety of methods, including formal lectures, tutorials and other directed independent learning activities and reinforced by laboratory tasks and seminars. Learning resources are made available on staff and module intranet pages, and through the Moodle to permit flexibility in engagement with the materials.

Analytical skills are developed through coursework tasks that encourage creativity and problem solving using a range of systems and technologies relevant to the information technology industry. Practical applications are a key feature of the course and are emphasized in course design and delivery. Learners are assessed both formatively and summatively by a number of methods, the criteria for each module being published within each specified module guide and assignment briefs.

Formative assessment occurs in various ways throughout the programme and may involve feedback from peers, tutors and individual reflection, seminars, coursework exercises and presentations.

Summative assessment may include coursework exercises, examinations (seen and unseen, open- and closed- book), presentations, and practical assignments. Intellectual skills, particularly analytical and problem solving skills, are developed using a range of case-studies and problem / task based learning scenarios.

Assessment of such activities includes practical simulation and design exercises and individual and group projects, in addition to the methods mentioned above. The acquisition of appropriate practical skills is central to the learning strategy of the programme. All technical themes provide weekly timetabled practical laboratory or PC based sessions, supported by lecturing or other technically qualified staff. The content of these sessions evolves as the student progresses through the course from guided tasks to develop basic practical skills in the use of measurement and test equipment and software tools, through exercises to reinforce the understanding of fundamental principles and techniques, to open-ended mini-projects to give experience of practical modelling, simulation and design of complex systems.

Assessment methods include laboratory and design reports, presentations and in-class demonstrations of working hardware and software or simulated designs.

Learners develop research skills in module activities and assessments by undertaking a small group project, and two major projects, one individual and one group-work, and completing a related dissertation.

Transferable/key skills are core to the learning and assessment strategy of the programme. They are pervasive, and are incorporated into modules and assessments as appropriate, e.g. team-working skills are fostered and assessed via group, task-based practical projects.

Learners are encouraged to plan their own work schedules and are required to meet deadlines. Reflection and self-awareness are fostered by keeping logbooks of laboratory and design activity and attending tutor interviews in support of personal Performance

### Programme structure and requirements, levels, modules, credits and awards.

The duration of study in Bachelor of Informatics was eight semesters and a total of **144 credit points**. The curriculum is continually revised and arranged to suffice the requirement of the development of information technology taking place both in Indonesia and worldwide.

No.	Code	Course Title	Credits
<b>SEMESTER I</b>			
1	IG141108	Bahasa Inggris <i>English</i>	3
2	KI141301	Dasar Pemrograman <i>Programming Fundamental</i>	4
3	KI141302	Matematika Diskrit <i>Discrete Mathematics</i>	3
4	KI141303	Sistem dan Teknologi Informasi <i>Information Technology and Systems</i>	2
5	KI141304	Sistem Digital <i>Digital System</i>	3
6	SM141203	Kalkulus I <i>Calculus I</i>	3
<b>Total Credits</b>			<b>18</b>
<b>SEMESTER II</b>			
1	IG14110x	Pendidikan Agama <i>Religion Education</i>	2
2	IG141106	Wawasan Kebangsaan <i>Nationalism</i>	3
3	KI141305	Aljabar Linier <i>Linear Algebra</i>	3
4	KI141306	Organisasi Komputer <i>Computer Organization</i>	3
5	KI141307	Struktur Data <i>Data Structure</i>	4
6	KI141331	Matematika Informatika <i>Mathematics for Informatics</i>	3
<b>Total Credits</b>			<b>18</b>
<b>SEMESTER III</b>			
1	KI141308	Pemrograman Berorientasi Objek <i>Object Oriented Programming</i>	3
2	KI141309	Perancangan dan Analisis Algoritma I <i>Design and Analysis Algorithm I</i>	3
3	KI141310	Probabilitas dan Statistik <i>Probabilistic and Statistic</i>	3
4	KI141311	Sistem Basis Data <i>Database System</i>	4
5	KI141312	Sistem Operasi <i>Operating System</i>	4
6	KI141313	Teori Graf	3

<i>Graph Theory</i>			
<b>Total Credits</b>			<b>20</b>
<b>SEMESTER IV</b>			
1	KI141314	Jaringan Komputer <i>Computer Network</i>	4
2	KI141315	Kecerdasan Buatan <i>Artificial Intelligence</i>	3
3	KI141316	Manajemen Basis Data <i>Database Management</i>	3
4	KI141317	Otomata <i>Automata</i>	3
5	KI141318	Pemrograman Web <i>Web Programming</i>	3
6	KI141319	Perancangan dan Analisis Algoritma II <i>Design and Analysis of Algorithms II</i>	3
<b>Total Credits</b>			<b>19</b>
<b>SEMESTER V</b>			
1	KI141320	Analisis dan Perancangan Sistem Informasi <i>Analysis and Design of Information Systems</i>	3
2	KI141321	Grafika Komputer <i>Computer Graphics</i>	3
3	KI141322	Kecerdasan Komputasional <i>Computational Intelligence</i>	3
4	KI141323	Komputasi Numerik <i>Numerical Computation</i>	3
5	KI141324	Pemrograman Jaringan <i>Network Programming</i>	3
6	KI141325	Perancangan Perangkat Lunak <i>Software Design</i>	3
<b>Total Credits</b>			<b>18</b>
<b>SEMESTER VI</b>			
1	KI141326	Interaksi Manusia dan Komputer <i>Human and Computer Interaction</i>	3
2	KI141327	Keamanan Informasi dan Jaringan <i>Information and Network Security</i>	3
3	KI141328	Rekayasa Kebutuhan <i>Requirement Engineering</i>	3
4	KI141329	Manajemen Proyek Perangkat Lunak <i>Software Project Management</i>	3
5		MK Pilihan 1 <i>Elective 1</i>	3
6		MK Pilihan 2 <i>Elective 2</i>	3
<b>Total Credits</b>			<b>18</b>
<b>SEMESTER VII</b>			
1	IG141109	Technopreneurship <i>Technopreneurship</i>	3

2	KI141330	Kerja Praktik <i>Internship</i>	2
3		MK Pilihan 3 <i>Elective 3</i>	3
4		MK Pilihan 4 <i>Elective 4</i>	3
5		MK Pilihan 5 <i>Elective 5</i>	3
6	KI141501	Proposal Tugas Akhir	2
<b>Total Credits</b>			<b>16</b>
<b>SEMESTER VIII</b>			
1	IG141107	Wawasan Teknologi dan Komunikasi Ilmiah <i>Technology and Communication</i>	3
2		MK pilihan 6 <i>Elective 6</i>	3
		MK pilihan 7 <i>Elective 7</i>	3
		MK pilihan 8 <i>Elective 8</i>	3
3	KI141502	Tugas Akhir <i>Final Project (Undergraduate Thesis)</i>	5
<b>Total Credits</b>			<b>17</b>

#### List of Elective Courses

No.	Code	Course Title	Credits
1	KI141401	Multivariate Data Analysis	3
2	KI141402	Computer Animation and 3D Modeling	3
3	KI141403	Software Architecture	3
4	KI141404	Data Mining	3
5	KI141405	Wireless Networking	3
6	KI141406	Cloud Computing	3
7	KI141407	Mobile Computing	3
8	KI141408	Framework-based Programming	3
9	KI141409	Linear Programming	3
10	KI141410	Digital Image Processing	3
11	KI141411	Software Quality Assurance	3
12	KI141412	Knowledge Engineering	3
13	KI141413	Enterprise Systems	3
14	KI141414	Game Development Techniques	3
15	KI141415	Internetworking Technology	3
16	KI141416	Systems Audit	3
17	KI141417	Software Evolution	3
18	KI141418	Multimedia Network	3
19	KI141419	Data Compression	3

20	KI141420	Biomedical Computing	3
21	KI141421	Grid and Paralel Computing	3
22	KI141422	Pervasive Computing and Sensor Network	3
23	KI141423	Software Construction	3
24	KI141424	Modeling & Simulation	3
25	KI141425	Mobile Device Programming	3
26	KI141426	Security Design Of System And Network	3
27	KI141427	Virtual and Augmented Reality	3
28	KI141428	Robotics	3
29	KI141429	Game System	4
30	KI141430	Geographic Information System	3
31	KI141431	Information Retrieval	3
32	KI141432	Information Technology Governance	3
33	KI141433	Specific Topics on Algorithms and Programming	3
34	KI141434	Specific Topics on Computer And Network Architecture	3
35	KI141435	Specific Topics on Interaction, Graphics & Art	3
36	KI141436	Specific Topics on Net-Centric Computing	3
37	KI141437	Computer Vision	3
38	KI141438	Social Media Analysis	3
39	KI141439	Distributed Databases	3
40	KI141440	Big Data	3
41	KI141441	Software Engineering Economics	3
42	KI141442	Digital Forensic	3
43	KI141443	Software Process Improvement	3
44	KI141444	Distributed System	3
45	KI141445	Specific Topics on Fundamentals & Applied Computation	3
46	KI141446	Specific Topics on Intelligent Computing and Visualization	3
47	KI141447	Specific Topics on Information Management	3
48	KI141448	Specific Topics on Software Engineering	3

### Criteria for admission

Candidates must satisfy the general admissions requirements of the programme, which are as follows:

- High school diploma from the field of natural science.
- Passing the State University National Entrance Test (Seleksi Nasional Masuk Perguruan Tinggi Negeri, SNMPTN), which either the Paper-Based mechanism is called Paper-based State University National Entrance Test (Seleksi Bersama Masuk Perguruan Tinggi Negeri, SBMPTN or Paper-based ITS Entrance Test (Seleksi Masuk ITS, SMITS).



## **Methods for evaluation and enhancement of quality and standards including listening and responding to views of students**

The following faculty committees are involved in evaluation and enhancement of quality, standards and student experience: Graduate Programme, Department Advisory Committee, Learning and Teaching Committee, Center for Quality Assurance, and Academic Senate of ITS.

Review and evaluation processes in which students are involved include annual course and module reviews, course review and re-approval events, professional body accreditation visits and external examiner visits. Mechanisms for student input include meetings with course tutors, feedback questionnaires, faculty and university student satisfaction surveys and representation on the faculty committees referred to above.

Contact for Queries

Deputy of Administrator

Informatics Department, Faculty of Information Technology

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