

Program Records

About the Program	The Computer Engineering Department at Abdullah Gul University is established in 2014 within the Faculty of Engineering. The department offers a comprehensive education and research facilities to meet the ever increasing demands of today's information and technology driven society. With this motivation, we provide our students a wide range of knowledge, skills and opportunities that will enable them to be successful engineers throughout their careers. The program focuses on contemporary fields of Computer Engineering including software, hardware, artificial intelligence, internet of things, digitalization, big data, embedded systems, cyber security, bioinformatics, and other basic and supporting areas.
Program Objectives	<p>The graduates of the Computer Engineering Department will be able to:</p> <ol style="list-style-type: none"> 1. Develop innovative solutions and technologies to solve global issues, 2. Work in the top level engineering and research and development projects at the national and international institutions, 3. Assume executive, leadership, and entrepreneurial roles in their careers.
Qualification Awarded	Bachelor's Degree
Length of Program & Credits	4 years (excluding one year of English Preparatory Program) 240 ECTS
Level of Qualification	First Cycle (Bachelor's) Degree; EQF-LLL Level 6, QF-EHEA Level 1
Mode of Study	Full Time
Field of Study	Computer
Admission Requirements	<p>High school diploma; Placed by National Higher Education Exam (YKS) scores; Proof of English proficiency (TOEFL or Abdullah Gül University English Proficiency Exam)</p> <p>For foreign students, proof the admission requirements that are announced by the university.</p>
Recognition of Credit Mobility	Courses taken outside of the program could be transferred in accordance with the associated principals of the Abdullah Gul University Undergraduate Education and Examination Regulation rules by the respective management board.
Graduation Requirements & Regulations	<ol style="list-style-type: none"> a) All courses in the curriculum must be completed with a minimum grade of D or S. b) Student has to complete all courses in the program curriculum with a minimum GPA of 2.00. c) At least half of the total credit of the curriculum must be taken in AGÜ except for the international joint degree programs conducted with the contracted higher education institutions abroad. d) Except for international exchange programs conducted with contracted higher education institutions abroad and partnering international undergraduate degree programs, the last two semesters must be completed at AGÜ

Occupational Profiles of Graduates

Computer engineers are concerned with the design, development, and implementation of computer technology into a wide range of consumer, industrial, commercial, and military applications. As more and more products incorporate or interact with computers, computer engineers are challenged to develop computer applications that improve the quality of life while being sensitive to manufacturing and distribution costs.

Computer Engineers are employed in industry, government, education, and consulting. It is difficult to find a company that doesn't require the expertise of computer engineers for its products or systems. Computer engineers frequently work on new applications of computers, such as advances in digital television and photography, virtual meeting technology, intelligent highways, control systems, and new technologies for cars, phones, security systems, telescopes, airplanes, and space vehicles. They usually work in teams with other engineers and individuals from other functional areas.

Some example sectors and companies that frequently employ computer engineers are: software, telecommunication, military and defense, banking and finance, appliances manufacturing, automotive sector, transportation, health, internet, and tourism.

Access to Further Studies

Graduates may apply to second cycle (Level 7 or Level 8) degree programs.

Assessment & Grading Policy

Based on Abdullah Gul University Undergraduate Education and Examination Regulation rules;

<u>Letter Grade</u>	<u>Coefficient</u>	<u>Score</u>	<u>Status</u>	<u>Letter Grade</u>	<u>Status</u>
A	4,00	90-100	Pass	NA	Not Attended
A-	3,67	87-89	Pass	W	Withdrawn
B+	3,33	83-86	Pass	I	Incomplete
B	3,00	80-82	Pass	T	Transferred
B-	2,67	77-79	Pass	S	Satisfactory
C+	2,33	73-76	Pass	U	Unsatisfactory
C	2,00	70-72	Pass	P	In Progress
C-	1,67	64-69	Conditional Pass	EX	Exempt
D+	1,33	56-63	Conditional Pass		
D	1,00	50-55	Conditional Pass		
F	0,00	0-49	Failed		

Program Outcomes

1. Apply knowledge of mathematics and natural sciences towards engineering problems
2. Design and perform experiments to analyze and interpret data
3. Identify, formulate and solve engineering problems
4. Design a component, process, system, or product to meet desired needs under realistic constraints and conditions, addressing economic, environmental, sustainability, producibility, ethical, social, political, health and security issues

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5. Function in multi-disciplinary teams
 6. Communicate effectively in Turkish and English
 7. Recognize the need for and an ability to engage in life-long learning
 8. Recognize and understand professional and ethical responsibilities
 9. Understand the impact of engineering solutions in a global, economic, environmental, and societal context
 10. Develop a knowledge of contemporary issues
 11. Use techniques, skills and modern engineering tools necessary for engineering practice
 12. Gain knowledge of discrete mathematics, probability and statistics, including applications appropriate to computer engineering
 13. Apply principles of computer science theory, including data structures, algorithms and complexity, and software engineering in the construction of software and hardware systems in a way demonstrating comprehension of the tradeoffs involved in design choice
 14. Gain knowledge of the design and operation of state of the art computer systems, as well as digital circuit design, computer architecture, operating systems, computer and communication networks, and database systems
 15. Understand project management, risk management, and change management concepts; as well as awareness of the importance of innovation and entrepreneurship for sustainable economic development.
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TQF-HE & Program Outcomes Coverage	Knowledge	Skills	Competences			
	Theoretical Conceptual	Cognitive Practical	Work Independently and Take Responsibility	Learning	Communication and Social	Field Specific
P01	X	X	X			
P02	X	X	X			
P03	X	X	X			
P04	X	X	X	X	X	X
P05			X		X	
P06			X		X	
P07				X	X	
P08		X	X			X
P09	X	X		X	X	
P010				X	X	
P011	X	X	X	X	X	
P012	X	X	X			
P013	X	X	X	X		
P014	X	X	X		X	
P015					X	

Institutional & Program Outcomes Coverage	IO1	IO2	IO3	IO4	IO5	IO6	IO7
P01	X				X		
P02	X				X		
P03	X				X		
P04	X				X		X
P05					X		
P06						X	
P07					X		
P08							X
P09			X	X			
P010			X				
P011	X				X		
P012	X				X		
P013	X				X		
P014		X					
P015		X					

Curriculum

(Semester 1) - Year 1, Fall Semester

Course Code	Course Name	Theoretical Hours	Practical Hours	Credits	ECTS
MATH 151	Calculus I	5	0	5	6
SCI 101	Science Elective*	3	2	4	5
COMP 101	Art of Computing	3	2	4	6
ELEC	Free Elective	3	0	3	4
GLB 101	AGU Ways	3	0	3	4
ENG 101	English I	4	0	4	4
TOTAL		21	4	23	29

(*) One of the following: PHYS 101, CHEM 101, BIO 101

(Semester 2) - Year 1, Spring Semester

Course Code	Course Name	Theoretical Hours	Practical Hours	Credits	ECTS
MATH 152	Calculus II	5	0	5	6
PHYS 102	Physics II	3	2	4	5
COMP 112	Object Oriented Programming	3	2	4	6
COMP 104	Exploring Computer Engineering	3	2	4	6
GLB 102	Innovation & Entrepreneurship	3	0	3	4
ENG 102	English II	4	0	4	4
TOTAL		21	6	24	31

(Semester 3) - Year 2, Fall Semester

Course Code	Course Name	Theoretical Hours	Practical Hours	Credits	ECTS
MATH 203	Linear Algebra	3	0	3	5
COMP 203	Data Structures and Algorithms	3	2	4	7
COMP 205	Mobile Programming	3	2	4	7
EE 203	Digital Design	3	2	4	6
GLB 201	Food and Health	3	0	3	4
TURK 201	Turkish I	2	0	2	2
TOTAL		17	6	20	31

(Semester 4) - Year 2, Spring Semester

Course Code	Course Name	Theoretical Hours	Practical Hours	Credits	ECTS
MATH 206	Discrete Mathematics	3	0	3	5
COMP 202	Software Engineering	3	0	3	7
COMP 204	Database Management Systems	3	0	3	6
XXX	Technical Elective	3	2	4	5
GLB 202	Immigration and Population	3	0	3	4
TURK 202	Turkish II	2	0	2	2
TOTAL		17	2	18	29

(Semester 5) - Year 3, Fall Semester

Course Code	Course Name	Theoretical Hours	Practical Hours	Credits	ECTS
COMP 351	Summer Training I	-	-	-	2
MATH 301	Probability and	3	0	3	5

	Statistics				
COMP 301	Analysis of Algorithms	3	2	4	6
COMP 303	Operating Systems	3	0	3	6
COMP 305	Computer Organization	3	2	3	6
GLB 301	Sustainability	3	0	3	4
HIST 301	History of Turkey I	2	0	2	2
TOTAL		17	4	18	31

(Semester 6) - Year 3, Spring Semester

Course Code	Course Name	Theoretical Hours	Practical Hours	Credits	ECTS
COMP 302	System Programming	3	2	4	5
COMP 304	Embedded Systems Programming	3	2	4	6
COMP 306	Formal Languages and Automata Theory	3	2	4	6
COMP 308	Computer Networks	3	0	3	6
GLB 302	Global Issues Elective	3	0	3	4
HIST 302	History of Turkey II	2	0	2	2
TOTAL		17	6	20	29

(Semester 7) - Year 4, Fall Semester

Course Code	Course Name	Theoretical Hours	Practical Hours	Credits	ECTS
COMP 451	Summer Training II	-	-	-	4
COMP 491	Capstone Project I	-	-	8	8
COMP	Departmental & Technical Elective	3	0	3	5
COMP	Departmental & Technical Elective	3	0	3	5
COMP	Departmental & Technical Elective	3	0	3	5
ELEC	Free Elective	3	0	3	4
OHS 401	Occupational Health & Safety I	2	0	2	1
TOTAL		14	0	22	32

(Semester 8) - Year 4, Spring Semester

Course Code	Course Name	Theoretical Hours	Practical Hours	Credits	ECTS
COMP 492	Capstone Project II	-	-	8	8
COMP	Departmental & Technical Elective	3	0	3	5
COMP	Departmental & Technical Elective	3	0	3	5
COMP	Departmental & Technical Elective	3	0	3	5
ELEC	Free Elective	3	0	3	4
OHS 402	Occupational Health & Safety II	2	0	2	1
TOTAL		14	0	22	28

Curriculum Summary

%		Courses	Credit	ECTS
10.0	AGU Signature Courses GLB101, GLB102, GLB201, GLB202, GLB301, GLB302	6	18	24
7.5	YÖK/HEC Courses ENG101, ENG102, TURK101, TURK102, HIST201, HIST202, OHS401, OHS402	8	20	18
42.5	Compulsory COMP101, COMP104, COMP112, COMP203, COMP205, COMP202, COMP204, COMP301, COMP303, COMP305, COMP302, COMP304, COMP306, COMP308, COMP491, COMP492	16	67	102
37.5	Non-Technical Electives ELEC, ELEC, ELEC	3	9	12
	Technical Electives MATH151, SCI101, MATH152, PHYS102, MATH203, EE203, MATH206, XXX, MATH301, COMP, COMP, COMP, COMP, COMP, COMP	15	53	78
2.5	Summer Practice COMP351, COMP451	2	0	6
100,0	TOTAL	50	167	240

Program Course Code Descriptions

Compulsory		Elective
	Year	G Elective (I)
COMP	X ° X	D Elective (II)
	0	A Elective (III)
	1	° X X X
	2	1
	3	2
	5	3
		4

Courses Descriptions

Code	COMP101
Name	Art of Computing
Hour per week	5 (3+2)
Credit	4
ECTS	6
Level/Year	Undergraduate/1
Semester	Fall, Spring
Type	Compulsory
Prerequisites	-
Content	The course aims to teach the essentials of computing to students who have little or no background in programming. The students will learn how to write basic computer programs using SNAP and Java. Through a course project the course also aims to develop design skills of the students.

Code	COMP104
Name	Exploring Computer Engineering
Hour per week	5 (3+2)
Credit	4
ECTS	6
Level/Year	Undergraduate / 1
Semester	Spring
Type	Compulsory
Prerequisites	-
Content	The main concepts of object oriented programming as well as complementary topics that are used extensively in modern computer programming will be given throughout the course. The main components of object oriented programming will be investigated in Java programming language. Also, various topics like exception handling, basic data structures, GUI design, and multithreading will be explained. Finally, some critical software engineering concepts like software code management and documentation will be discussed briefly.

Code	COMP112
Name	Object Oriented Programming
Hour per week	5 (3+2)
Credit	4
ECTS	6
Level/Year	Undergraduate / 1
Semester	Spring
Type	Compulsory
Prerequisites	COMP 101
Content	The main concepts of object oriented programming as well as complementary topics that are used extensively in modern computer programming will be given throughout the course. The main components of object oriented programming will be investigated in Java programming language. Also, various topics like exception handling, basic data structures, GUI design, and multithreading will be explained. Finally, some critical software engineering concepts like software code management and documentation will be discussed briefly.

Code	COMP202
Name	Software Engineering
Hour per week	3 (3+0)
Credit	3
ECTS	7
Level/Year	Undergraduate / 2
Semester	Spring
Type	Compulsory
Prerequisites	COMP 101
Content	In this course, the introductory concepts of software engineering will be given. The software life cycle and various phases of software development such as feasibility study and analysis, software specification and design, implementation and testing, and documentation and maintenance will be discussed. Some tools, techniques, environments, and methodologies regarding these issues will be given and explained. Lastly, some project management related issues like project planning, organization, control, and professional ethics will be discussed as part of the general context of software engineering.

Code	COMP203
Name	Data Structures and Algorithms
Hour per week	5 (3+2)
Credit	4
ECTS	7
Level/Year	Undergraduate / 2
Semester	Fall
Type	Compulsory
Prerequisites	COMP 112
Content	The purpose of this course is to provide the students with solid foundations in the basic concepts of programming: data structures and algorithms. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter. This course is also about comparing algorithms and studying their correctness and computational complexity. This course offers the students a mixture of theoretical knowledge and practical experience using Java.

Code	COMP204
Name	Database Management Systems
Hour per week	3 (3+0)
Credit	3
ECTS	6
Level/Year	Undergraduate / 2
Semester	Spring
Type	Compulsory
Prerequisites	COMP 101
Content	This course provides a comprehensive overview of design and implementation of relational databases with web access for database-driven Web applications. The students will also learn about database management systems (such as Oracle), database administration, and database querying with SQL.

Code	COMP205
Name	Mobile Programming
Hour per week	5 (3+2)
Credit	4
ECTS	7
Level/Year	Undergraduate / 2
Semester	Fall
Type	Compulsory
Prerequisites	COMP 101
Content	The main concepts of mobile programming as well as complementary topics that are used extensively in modern computer programming will be given throughout the course. Also, various topics like GUI design, and multithreading will be explained. Finally, some critical software engineering concepts like software code management and documentation will be discussed briefly.

Code	COMP301
Name	Analysis of Algorithms
Hour per week	5 (3+2)
Credit	4
ECTS	6
Level/Year	Undergraduate / 3
Semester	Fall
Type	Compulsory
Prerequisites	COMP 203
Content	The purpose of this course is to provide the students with a good understanding of the mathematical concepts needed to study the performance of computer programs. The mathematics needed to support scientific studies that can serve as the basis for predicting algorithm performance and comparing different algorithms on the basis of performance will be given. The material covered in this course draws from classical mathematical topics, including discrete mathematics, elementary real analysis, and combinatorics, as well as from classical computer science topics, including algorithms and data structures.

Code	COMP302
Name	System Programming
Hour per week	5 (3+2)
Credit	4
ECTS	5
Level/Year	Undergraduate / 3
Semester	Spring
Type	Compulsory
Prerequisites	COMP 112
Content	The course aims to teach the essentials of system programming for Unix and Linux. The students will learn how to write basic shell scripts, Python scripts and will get a hands on experience and knowledge on the structure of Unix/Linux operating systems.

Code	COMP303
Name	Operating Systems
Hour per week	3 (3+0)
Credit	3
ECTS	6
Level/Year	Undergraduate / 3
Semester	Fall
Type	Compulsory
Prerequisites	COMP 203
Content	This course provides a comprehensive overview of process management, file systems. It will also cover the efficient use of operating system (OS) and OS design.

Code	COMP304
Name	Embedded Systems Programming
Hour per week	5 (3+2)
Credit	4
ECTS	6
Level/Year	Undergraduate / 3
Semester	Spring
Type	Compulsory
Prerequisites	COMP 305
Content	The course aims to teach the essentials of embedded systems and how the computer interacts with its environment. Students will analyze the working principles of computers and develop embedded systems on microprocessors using assembly and C programming languages.

Code	COMP305
Name	Computer Organization
Hour per week	5 (3+2)
Credit	3
ECTS	6
Level/Year	Undergraduate / 3
Semester	Fall
Type	Compulsory
Prerequisites	EE 203
Content	This course provides a comprehensive presentation of the organization and architecture of modern-day computers, emphasizing both fundamental principles and the critical role of performance in driving computer design. The topics include number system, computer arithmetic, computer evolution and performance, memory, storage, input/output, details of a processor, multi-cores, multiprocessors and clusters.

Code	COMP306
Name	Formal Languages and Automata Theory
Hour per week	5 (3+2)
Credit	4
ECTS	6
Level/Year	Undergraduate / 3
Semester	Spring
Type	Compulsory
Prerequisites	MATH 206
Content	The main concept of the theory of computation will be given throughout the class. Key mathematical language classes like Regular languages and context-free languages will be explained. Also, the Church-Turing thesis and Turing machines which constitute the heart of the Theory of Computation will be explained as well as related topics as Decidability and Reducibility. Finally, a brief introduction to time complexity analysis of algorithms and main mathematical problem classes like class P and class NP will be provided.

Code	COMP308
Name	Computer Networks
Hour per week	3 (3+0)
Credit	3
ECTS	6
Level/Year	Undergraduate / 3
Semester	Spring
Type	Compulsory
Prerequisites	
Content	This course provides a comprehensive overview of computer networks and mobile communications technologies. The topics include computer networks, Internet, TCP/IP, transport layer protocols, routing layer protocols, medium access control protocols, wireless channel models, cellular networks and wireless local area networks. After completing the course, students will get a basic understanding about the computer networks and mobile communications, and related problem solving discipline using mathematics / engineering principles.

Code	COMP351
Name	Summer Training I
Hour per week	1 (1+0)
Credit	0
ECTS	2
Level/Year	Undergraduate / 3
Semester	Fall
Type	Compulsory
Prerequisites	
Content	The purpose of this course is to enable students to apply academic knowledge to real-world problems and to gain real working environment experience.

Code	COMP401
Name	Bioinformatics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	This course introduces students to the fundamental theories and practices of bioinformatics and computational biology. The students will get an understanding and practice on the types of biological data, biological databases as well as computational problems and algorithms related to biological data analysis.

Code	COMP402
Name	Wireless and Mobile Networks
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	COMP 308
Content	This course covers wireless and mobile networking concepts and protocols with real-world examples. This course aims to provide students with a basic understanding about the wireless and mobile networks and related problem solving discipline using mathematics / engineering principles.

Code	COMP403
Name	Blockchain and Crypto Currencies
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	The Blockchain, mostly used in cryptocurrency applications, is a newly developed model to create a trusted peer-to-peer network with untrusted parts. The technology has a revolutionary role in cyber-security innovation since omitting trusted authority within the parts of the contributors. This class aims to learn and understand the details of the blockchain, and to be able to apply this model to proper problems.

Code	COMP404
Name	Data Mining
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	This course provides an introduction to data mining. It covers fundamental pattern discovery techniques such as frequent itemset and association rule detection, efficient data structures and algorithms that have good scaling properties and fundamental classification and clustering algorithms. Through a course project, the students will program a data mining software and apply the concepts to a real problem.

Code	COMP405
Name	Image Processing
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	The main concepts of image processing, various methods of processing image information and methods of manipulating images for different objectives will be given throughout this course. The concept of image as a signal and how to utilize signal theory for image processing purposes using related mathematical operations and tools will be explained. Related topics such as color, noise, image components will be explained. Lastly, more complex concepts such as image compression and morphing will be explained with some well-known examples.

Code	COMP406
Name	Computer Graphics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	This course provides a comprehensive introduction to computer graphics modeling, animation, and rendering. In this course, the basic image processing, geometric transformations, geometric modeling of curves and surfaces, animation, 3-D viewing, visibility algorithms, shading, and ray tracing topics will be covered. Also, GPU programming will be briefly explained.

Code	COMP407
Name	Machine Learning
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	This course provides an introduction to machine learning. Students will learn the concepts behind the algorithms by exploring the fundamental theoretical principles without going deeply into the mathematics and gain practical experience by applying the techniques on selected problems.

Code	COMP408
Name	High Performance Computing Systems
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	This course will provide students with an in-depth analysis of the current issues in HPC systems including parallel computing, new processor architectures, power-aware computing and communication, advanced topics on petascale computing and optical systems. In addition, parallel models of computation such as dataflow, and demand-driven computation will also be studied.

Code	COMP409
Name	Design Patterns
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	This course is an introduction to software design patterns. Each pattern represents a best practice solution to a software problem in some context. The course will cover the rationale and benefits of object-oriented software design patterns. Several example problems will be studied to investigate the development of good design patterns. Specific patterns, such as Strategy, Observer, Decorator, Factory, Singleton, and Adapter will be discussed. Programming projects in the Java language will provide experience in the use of these patterns.

Code	COMP 411
Name	Communication Networks
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall / Spring
Type	Elective
Prerequisites	COMP 308
Content	This course provides an overview of communication networks and wireless communications technologies. The topics include wireless channel models, queuing theory, cellular networks and wireless local area networks, etc. After completing the course, students will get a basic understanding about communication networks and related problem solving discipline using mathematics / engineering principles.

Code	COMP 430
Name	Digital Image Processing
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall / Spring
Type	Elective
Prerequisites	
Content	The principle objectives of this course are to provide an introduction to basic concepts and methodologies for digital image processing, and to develop a foundation that can be used as the basis for further study and research in this field.

Code	COMP 431
Name	Computer Vision
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	This course provides an introduction to computer vision, including fundamentals of image formation, camera imaging geometry, feature detection and matching, motion estimation and tracking, image classification, scene understanding, and deep learning with neural networks. The focus of the course is to be able to understand, discuss and apply the theoretical knowledge gained to the projects.

Code	COMP451
Name	Summer Training II
Hour per week	1 (1+0)
Credit	0
ECTS	4
Level/Year	Undergraduate / 4
Semester	Fall
Type	Compulsory
Prerequisites	
Content	The objective of this course is to give students the opportunity to apply their academic knowledge to real world problems and to experience real working environments. The students will also let students to make better career plans by observing these working environments.

Code	COMP455
Name	Linux for Engineers and Scientists
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/-
Semester	Fall, Spring
Type	Elective
Prerequisites	-
Content	Linux is a computer operating system that appears in different architectures: mainframes, servers, desktops, and laptops. Engineers and researchers in any fields may encounter a situation in which Linux knowledge is critical to pursue their studies. This course is primarily designed for would-be users of Linux. Topics include common Linux commands, bash, high function editor (vim), filters (grep, sed, and awk), and document-preparation tools (LaTeX). Upon completion of the course, students should be intermediate-level Linux users who possess good working knowledge of Linux and can keep developing their Linux knowledge and skills autonomously.

Code	COMP 461
Name	Deep Learning

Code	COMP462
Name	Bioinformatics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall/Spring
Type	Elective
Prerequisites	
Content	This course introduces students to the fundamental theories and practices of bioinformatics and computational biology. The students will get an understanding and practice on the types of biological data, biological databases as well as computational problems and algorithms related to biological data analysis.
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall / Spring
Type	Elective
Prerequisites	
Content	This course provides an introduction to deep learning. It covers deep architectures for multi-layer perceptrons, auto-encoders, convolutional neural networks, recurrent neural networks, generative adversarial networks, Hopfield networks, Boltzman machines and belief networks. The course also provides applications of neural networks for text, image, and speech processing. Methods will be implemented by a software and applied on various machine learning problems.

Code	COMP 463
Name	Computational Genomics
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall / Spring
Type	Elective
Prerequisites	
Content	This course will discuss computational issues arising from high-throughput techniques recently introduced in genomics, including next-generation sequencing data analysis, genome-wide association study data analysis, the identification of genomic variations and their functional effects, biological networks, pathway analysis, epigenome analysis, cancer genomics. Throughout the course, the current computational genomics approaches that are used to understand disease development and progression mechanisms will be covered. Along this line, two newly emerging disciplines, i.e. personalized medicine and pharmacogenomics will be discussed in this course.

Code	COMP464
Name	Pattern Recognition
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate/1
Semester	Fall, Spring
Type	Technical Elective
Prerequisites	-
Content	This course provides fundamental knowledge and skills for pattern recognition. It covers generative models, Bayesian learning methods, decision theory, Gaussian models, Bayesian statistics, frequentist statistics, regression models, generalized linear models and the exponential family, mixture models, expectation maximization, latent linear models, and sparse linear models. Mathematical principles will be explained to provide a solid foundation for pattern recognition. The course will include formulating mathematical models, developing methods and algorithms, implementing computer programs for solving pattern recognition problems and applying the techniques learned to real problems.

Code	COMP 465
Name	Artificial Intelligence
Hour per week	3+0 (Theory + Practice)
Credit	3
ECTS	5
Level/Year	Undergraduate/Graduate
Semester	Spring
Type	Elective
Location	
Prerequisites	Art of Computing, Object Oriented Programming, Calculus, Probability and Statistics, Linear Algebra,
Content	This course provides an introduction to Artificial Intelligence. In this course, we will learn the concepts that underlie intelligent systems. Topics we will cover include problem solving with search, constraint satisfaction, knowledge representation and reasoning using some probabilistic learnings and first order logics, reasoning under uncertainty, introduction to machine learning, and introduction to reinforcement learning.

Code	COMP482
Name	Parallel Architectures
Hour per week	3 (3+0)
Credit	3
ECTS	5
Level/Year	Undergraduate / 4
Semester	Fall / Spring
Type	Elective
Prerequisites	
Content	The main objective of the course is to build a strong understanding of the fundamentals of the architecture of parallel computers and the tradeoffs made in their design. These parallelisms, such as, multi-core architectures, parallel memory systems, vector architectures, dataflow machines, and interconnection networks will be explained in the class.

Code	COMP491
Name	Capstone Project I
Hour per week	3 (3+0)
Credit	8
ECTS	8
Level/Year	Undergraduate / 4
Semester	Fall
Type	Compulsory
Prerequisites	
Content	This is the first one of the two capstone projects required by the students for graduation. Students work on individual design projects and, guided by their adviser, they learn the required theory needed for the completion of their projects and apply it through implementation and testing. Each design project includes the project specification, design, implementation and finally testing steps, and graded on successful completion and deployment as well as on documentation and final oral presentations.

Code	COMP492
Name	Capstone Project II
Hour per week	3 (3+0)
Credit	8
ECTS	8
Level/Year	Undergraduate / 4
Semester	Spring
Type	Compulsory
Prerequisites	
Content	This is the second and last installment of the student's graduation project. The student is expected to complete his work that is started in Capstone 1 course and make a successful demonstration in the end of the term. The student is also expected to demonstrate the technical skills he acquired during the computer engineering study program as well as independent learning skills by showing a working computer hardware/software system that he developed.