NEAR EAST UNIVERSITY

DEPARTMENT OF ARTIFICIAL INTELLIGENCE ENGINEERING

Course Structure Diagram with Course Credits

2021-2022

Courses List with Near East University credits and ECTS

Please see the attached example of the diploma supplement which is given to all graduates of our university free of charge. It is arranged in English.

The diploma supplement is a document the purpose of which is to provide sufficient independent data to improve the international “transparency” and fair academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.). It is designed to provide a description of the nature, level, context, content and the status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgments, equivalence statements or suggestions about recognition.

FACULTY OF ENGINEERING

DEPARTMENT OF ARTIFICIAL INTELLIGENCE ENGINEERING

	1st Semester								2nd Semester							
CODE	COURSE NAME	DERS ADI	C/E	T	P	C	E		CODE	COURSE NAME	DERS ADI	C/E	T	P	C	E
MTH 113	Linear Algebra	Doğrusal Cebir	C	3	0	3	5		ECC 104	Discrete Structures	Diskrit Yapılar	C	3	0	3	6
ECC 102	Programming and Problem Solving	Programlama ve Problem Çözme	C	4	2	4	4		ENG 102	English II	İngilizce II	C	3	0	3	3
CAR122	Career Planning	Kariyer planlaması	C	2	0	0	2		MTH 102	Calculus II	Matematik II	C	4	0	4	6
ENG 101	English I	İngilizce I	C	3	0	3	3		PHY 102	General Physics II	Genel Fizik II	C	4	2	4	7
MTH 101	Calculus I	Matematik I	C	4	0	4	5		ECC108	Object Oriented Programming	Nesne Yönümlü Programlama	C	3	2	3	6
PHY 101	General Physics I	Genel Fizik I	C	4	2	4	5		YIT102	Turkish for Foreigners II	Yabancılar için Türkçe II	C	2	0	2	2
YIT101	Turkish for Foreigners I	Yabancılar için Türkçe I	C	2	0	2	2									
CAM100	Campus Orientation	Kampüse Uyum	C	2	0	0	2									
CHC100	Cyprus History and Culture	Kıbrıs Kültürü ve Tarihi	E	2	0	0	2									
Total				26	4	20	30		Total				19	4	19	30

	3rd Semester								4th Semester							
CODE	COURSE NAME	DERS ADI	C/E	T	P	C	E		CODE	COURSE NAME	DERS ADI	C/E	T	P	C	E
ECC 001	Logic Design	Sayısal Mantık	C	4	2	4	6		ECC 202	Database Management Systems	Veri Tabanı Yönetim Sistemleri	C	4	0	4	7
ECC 201	Data Structures& Algorithms	Veri Yapıları ve Algoritmalar	C	4	2	4	6		AIE204	Neural Computation	Sinirsel Hesaplamalar	C	3	2	3	5
AIE201	AI: Principles and Techniques	Yapay Zeka:İlke ve Teknikleri	C	3	0	3	5		AIE206	Reasoning and Agents in AI	Yapay Zekada Akıl Yürütme ve Araçlar	C	4	0	4	6
MTH 201	Differential Equations	Diferansiyel Denklemler	C	4	0	4	6		MTH 251	Probability and Statistics	Olasılık ve İstatistik	C	3	0	3	6
ECC007	Multimedia Systems	Multimedya Sistemleri	C	3	0	3	5		AIT104	Atatürk Principles & Reforms II	Atatürk Prensipleri ve Reformları	C	2	0	2	4
AIT 103	Atatürk Principles & Reforms I	Atatürk Prensipleri ve Reformları	C	2	0	2	2		COM 200	Summer Training I	Staj 1	C	0	0	0	2
Total				20	4	20	30		Total				16	2	16	30

	5th Semester								6th Semester						
CODE	COURSE NAME	DERS ADI	C/E	T	P	C	E	CODE	COURSE NAME	DERS ADI	C/E	T	P	C	E
ECC 302	Operating Systems	İşletim Sistemleri	C	3	0	3	7	AIE302	Introduction to Machine Learning	Makine Öğrenimine Giriş	C	4	2	4	6
AIE301	Pattern Recognition	Desen Tanıma	C	3	2	3	7	ECC303	Data Communications and Networking	Veri İletişimi ve Ağlar	C	4	2	4	6
ENG201	Oral Communication Skills	Sözlü İletişim Becerileri	C	3	0	3	5	AIE304	Learning in Humans	İnsanlarda Öğrenme	C	3	0	3	6
AIE303	Natural Language Processing	Doğal Dil İşleme	C	4	2	4	7	AIE306	Deep Learning	Derin Öğrenme	C	3	2	3	6
ECC439	Occupational Health and Safety I	İş Sağlığı ve Güvenliği I	C	2	0	2	4	ECC440	Occupational Health and Safety II	İş Sağlığı ve Güvenliği II	C	2	0	2	4
								AIE399	Summer Training II	Staj II	C	0	0	0	2
Total				15	4	15	30	Total				16	6	16	30

	7th Semester								8th Semester						
CODE	COURSE NAME	DERS ADI	C/E	T	P	C	E	CODE	COURSE NAME	DERS ADI	C/E	T	P	C	E
AIE401	Introduction to Robotics	Robotiğe Giriş	C	3	2	3	7	ECC429	Engineering Ethics	Mühendislik Etiği	C	3	0	3	6
AIE403	Computer Vision	Bilgisayar Görüşü	C	3	2	3	7	AIE492	Senior Project II	Bitirme Projesi II	C	4	0	4	7
AIE491	Senior Project I	Bitirme Projesi	C	3	0	3	6	AIE402	Speech Processing	Konuşma İşleme	C	3	2	3	7
TE	Technical Elective	Teknik Seçmeli	E	3	0	3	5	TE	Technical Elective	Teknik Seçmeli	E	3	0	3	5
TE	Technical Elective	Teknik Seçmeli	E	3	0	3	5	TE	Technical Elective	Teknik Seçmeli	E	3	0	3	5
Total				15	4	15	30	Total				16	2	16	30

Technical Elective Courses

Basic Departmental Courses

Departmental Courses

Departmental Elective Courses

Non-Departmental Elective Courses

Course Code	Course Name	Credit	ECTS	Prerequisite	Class Hours	LAB
ECC419	Image Processing	3	5	3	2	
ECC415	Decision Making	3	5	3	0	
AIE411	Advanced Data Analysis	3	5	3	0	
AIE412	Information Retrieval and Web Search	3	5	3	0	
AIE413	Human-Robot Interaction	3	5	3	2	
AIE414	Deep Reinforcement Learning and Control	3	5	3	2	
AIE415	Mobile Robot Programming	3	5	3	2	
AIE416	Autonomous Agents	3	5	3	2	
AIE417	Introduction to Quantum Computing	3	5	3	0	
AIE418	Computer Animation & Visualization	3	5	3	2	
AIE419	Algorithmic Game Theory and its Applications	3	5	3	2	
AIE420	Fuzzy Systems	3	5	3	2	

Course objectives and contents

Course Name: MTH101 Mathematics I

Lecture Hours and ECTS:(4 - 0) 6
Course Description: Functions, limits and continuity. Derivatives. Mean value theorem. Sketching graphs. Definite integrals, infinite integrals (antiderivatives). Logarithmic, exponential, trigonometric and inverse trigonometric functions and their derivatives. L'Hospital's rule. Techniques of integration. Applications of the definite integral, improper integrals.

Course Name: PHY101 General Physics I
Lecture Hours and ECTS:(4 - 2) 5
Course Description: Measurement, Estimating, Kinematics in one Dimension, Vectors, Newton's Laws of Motion, Application of Newton's Laws, Work and Energy, Conservation of Energy, Linear Momentum and Collisions.

Course Name: ENG101 English I
Lecture Hours and ECTS:(3 - 0) 3
Course Description: This first-year course focuses on the skills of academic reading, writing, listening and speaking. It revolves around thematic modules and aims at developing critical thinking skills, which enable students to become confident lifelong learners. It is offered in fall and summer terms.

Course Name: MTH113 Linear Algebra
Lecture Hours and ECTS:(3 - 0) 5
Course Description: This course aims to give details of Linear Algebra to students. Matrices and Systems of Equations, Determinants, Vector Spaces, Linear Transformations, Orthogonality, Eigenvalues, Numerical Linear Algebra will be thought during the semester.

Course Name: YİT101 Turkish for Foreign Students I
Lecture Hours and ECTS:(2 - 0) 2
Course Description: The aim of this course is to introduce Turkish Language for Foreign Students of NEU. Fundamentals of Turkish phonology, simple sentence structures, vocabulary, simple sentence structure of Turkish, case endings and certain structures necessary for fluent communication, tenses and possessive constructions, reading articles and essays written in Turkish will be thought during the semester.

Course Name: ECC102 Programming and Problem Solving
Lecture Hours and ECTS:(4 - 0) 4
Course Description: This course provides an introduction to fundamental concepts of programming and use of built-in data structures in solving problems using the Python general-purpose programming language. this course, students study how write user-defined functions using iteration as well as recursion in Python. This course also stresses the importance of programming tools such as programming editors and debuggers. The students are expected to work within a GNU/Linux environment. The course provides a basic introduction into object-oriented programming.

Course Name: MTH102 Mathematics II
Lecture Hours and ECTS:(4 - 0) 6
Course Description: Course content: Plane and polar co-ordinates, area in polar co-ordinates, arc length of curves. Limit, continuity and differentiability of function of several variables, extreme values, method of Lagrange multipliers. Double Integral, triple integral with applications. Line integrals, Green's theorem. Sequences, infinite series, power series, Taylor's series. Complex numbers.

Course Name: PHY102 General Physics II
Lecture Hours and ECTS:(4 - 2) 7
Course Description: Centre of Mass, Rotation About a Fixed Axis (angular quantities, kinematic equations, torque, moment of inertia, rotational kinetic energy), General Rotation, (the torque vector, angular momentum, conservation of angular momentum) Static Equilibrium, Elasticity and Fracture (statics, stability and balance, elasticity, stress, strain, fracture, trusses and bridges, arches and domes), Fluids (density, pressure, Pascal's principle, bouyancy and Archimedes principles, fluids in flow, Bernoulli's equation).

Course Name: ENG102 English II
Lecture Hours and ECTS:(3 - 0) 3
Course Description: This thematic integrated course builds on EAP 1 by further improving students' reading, writing, listening and speaking skills in academic contexts. It is offered in the spring and summer terms.

Course Name: ECC108 Object Oriented Programming
Lecture Hours and ECTS:(3 - 0) 6
Course Description: This course provides an in-depth discussion of object-oriented programming and how object oriented programming can be used in solving real-life problems. This course requires a more advanced use of programming tools (mainly editors and debuggers) that were introduced in ECC102 (Programming and Problem Solving). This course uses Python 3 to teach the fundamental concepts of object-oriented programming. The students are expected to work within a GNU/Linux environment. The course builds upon the knowledge of ECC102 and ECC201 and is the third course in line that uses Python as programming language.

Course Name: ECC104 Discrete Structures
Lecture Hours and ECTS:(3 - 0) 6
Course Description: This course aims to introduce students about discrete structures. Sets and Logic, Proofs, Functions, Sequences and Relations, Algorithms, Introduction to Number Theory, Counting Methods and the Pigeonhole Principle, Recurrence Relations, Graph Theory, Trees, Network Models, Boolean Algebras and Combinatorial Circuits, Automata, Grammars and Languages, Computational Geometry will be thought during the semester.

Course Name: YİT102 Turkish for Foreign Students II
Lecture Hours and ECTS:(2 - 0) 2
Course Description: The aim of this course is to introduce Turkish Language for Foreign Students of NEU. Fundamentals of Turkish phonology, simple sentence structures, vocabulary, simple sentence structure of Turkish, case endings and certain structures necessary for fluent communication, tenses and possessive constructions, reading articles and essays written in Turkish will be thought during the semester.

Course Name: MTH201 Differential Equations
Lecture Hours and ECTS:(4 - 0) 6
Course Description: Introducing first, second and higher order differential equations, and the methods of solving these equations. Emphasizing the important of differential equations and its engineering application. Introducing the Laplace transform and its applications in solving differential equations and other engineering applications. Introducing the series method in solving differential equations.

Course Name: ECC201 Data Structures and Algorithms
Lecture Hours and ECTS:(4 - 2) 6
Course Description: This course comprises an introductory exploration into the design and implementation of Abstract Data Types (ADTs) along with the study of algorithm design and complexity analysis. Even though the discussions during lectures about ADTs are language independent, this course uses Python, a very high-level general programming language, to implement these ideas using object-oriented programming. This class starts with a brief introduction to object-oriented programming.

Course Name: ECC001 Logic Design
Lecture Hours and ECTS:(4 - 2) 6
Course Description: The aim of this course is to give the basics of Digital Logic Systems. Digital Systems and Information, Combinational Logic Circuits, Combinational Logic Design, Arithmetic Functions and HDLs, Sequential Circuits, Selected Design Topics, Registers and Register Transfers, Memory Basics, Computer Design Basics, Instruction Set Architecture, RISC and CISC Processors, Input-Output and Communication, Memory Systems will be thought during the semester.

Course Name: ECC007 Multimedia Systems
Lecture Hours and ECTS:(3 - 2) 5
Course Description: The aim of this course is to introduce students about the Multimedia Systems. Introduction to Computer Science and Media Computation, Introduction to Programming in Jython, Modifying Pictures Using Loops, Modifying Pixels in a Range, Advanced Picture Techniques, Modifying Sounds Using Loops, Modifying Samples in a Range, Making Sounds by Combining Pieces, Building Bigger Programs, Creating and Modifying Text, Advanced Text Techniques:Web and Information, Making Text for theWeb, Creating and Modifying Movies, Speed, Functional Programming, Object-Oriented Programming will be thought during the semester.

Course Name: AIE201 AI: Principles and Techniques
Lecture Hours and ECTS:(3 - 0) 5
Course Description: What do web search, speech recognition, face recognition, machine translation, autonomous driving, and automatic scheduling have in common? These are all complex real-world problems, and the goal of artificial intelligence (AI) is to tackle these with rigorous mathematical tools. In this course, students will learn the foundational principles that drive these applications and practice implementing some of these systems.

Course Name: AIT103 Principles of Atatürk and the History of Revolution I
Lecture Hours and ECTS:(2 - 0) 2
Course Description: Beside discussing the definition of the term " Revolution" by giving some examples such as French and Russian Revolutions, this course mainly focuses on the historical process that laid the basis of the foundation of Modern Turkey.In this context, after presenting a concise political history of the Ottoman Empire and its state mechanism, the political, social and economical developments between the Sultan Selim III Period (1789-1808) and the proclamation of Republic of Turkey by Mustafa Kemal Ataturk in 1923, are examined.

Course Name: ECC202 Database Management Systems
Lecture Hours and ECTS:(4 - 0) 6
Course Description: This course comprises an introductory exploration into the design and implementation of database systems. Relational Data Model and SQL, Conceptual Modeling and Database Design, Models, Database Programming Techniques, Database Normalization Theory, File Structures-Indexing and Hashing, Query Processing-Optimization and Database Tuning, Transaction Processing-Concurrency Control and Recovery, Security and Distribution, Advanced Database Models-Systems and Applications will be thought during the semester.

Course Name: AIE204 Neural Computation
Lecture Hours and ECTS:(3 - 2) 5
Course Description: In this course the computations carried out by the nervous system will be studied. Unlike most courses and artificial intelligence, a bottom-up approach will be taken. Apart from learning about the brain, numerical modelling of differential equations, non-linear dynamics, current neurobiological research and pitfalls in modelling real-world systems will be thought during the semester.

Course Name: AIE206 Reasoning and Agents in AI
Lecture Hours and ECTS:(4 - 0) 6
Course Description: This course focuses on approaches relating to representation, reasoning and planning for solving real world inference. The course illustrates the importance of (i) using a

smart representation of knowledge such that it is conducive to efficient reasoning, and (ii) the need for exploiting task constraints for intelligent search and planning. The notion of representing action, space and time is formalized in the context of agents capable of sensing the environment and taking actions that affect the current state. There is also a strong emphasis on the ability to deal with uncertain data in real world scenarios.

Course Name: MTH251 Probability and Statistics
Lecture Hours and ECTS: (3 - 0) 6
Course Description: The aim of this course is to give details of probability to students. Statistics, Data and Statistical Thinking, Methods for Describing Sets of Data, Probability, Random Variables and Probability Distributions, Inferences Based on Samples, Design of Experiments and Analysis of Variance, Categorical Data Analysis, Simple Linear Regression, Multiple Regression and Model Building, Methods for Quality Improvement: Statistical Process Control, Time Series, Nonparametric Statistics will be thought during the semester.

Course Name: AIT104 Principles of Atatürk and the History of Revolution II
Lecture Hours and ECTS:(2 - 0) 2
Course Description: The political, social, economical and cultural transformation in the Republic of Turkey; The six principles of Atatürk and Kemalizm; Turkish Foreign Policy during the Atatürk period.

Course Name: ECC302 Operating Systems
Lecture Hours and ECTS:(3 - 0) 7
Course Description: The aim of this course is to give details of operating systems and how they work to students. Principles of operating systems. Memory management. Multiprocessing. Virtual memory concepts. Memory protection. Scheduling. Process management. Time-slicing and priorities, deadlocks and process synchronization. Peripheral control. Filing system management. Resource control and monitoring. Linux and Windows Operating Systems will be covered during the semester.

Course Name: AIE301 Pattern Recognition
Lecture Hours and ECTS:(3 - 2) 7
Course Description: A pattern recognition system can be designed based on a number of different approaches: (i) template matching, (ii) geometric (statistical) methods, (iii) structural (syntactic) methods, and (iv) neural (deep) networks. This course will introduce the fundamentals of statistical pattern recognition with examples from several application areas. The course will cover techniques for visualizing and analyzing multi-dimensional data along with algorithms for projection, dimensionality reduction, clustering and classification.

Course Name: ENG201 Oral Communication Skills
Lecture Hours and ECTS:(3 - 0) 5
Course Description: The aim of the course is to provide techniques for dealing with academic prose.
Definition of Technical Communication, Profiling Audiences, The Technical Communication Process, Technical Communication Style, Researching, Designing Pages, Using Visual Aids, Summarizing, Defining, Describing, Sets of Instructions, Memorandums and Informal Reports, Developing Websites, Formal Reports, Recommendation and Feasibility Reports, Proposals, User Manuals, Oral Presentations, Letters, Job Application Materials will be tought during the semester.

Course Name: AIE303 Natural Language Processing
Lecture Hours and ECTS:(4 - 2) 7
Course Description: The intent of the course is to present a fairly broad graduate-level introduction to Natural Language Processing (NLP, a.k.a. comptuational linguistics), the study of computing systems that can process, understand, or communicate in human language. The primary focus of the course will be on understanding various NLP tasks, algorithms for effectively solving these problems, and methods for evaluating their performance. There will be a focus on

statistical and neural-network learning algorithms that train on (annotated) text corpora to automatically acquire the knowledge needed to perform the task.

Course Name: ECC439 Occupational Health and Safety I
Lecture Hours and ECTS:(2 - 0) 4
Course Description: The aim of the course is to introduce students about safety applications in real life practices. Occupational Health and Historical Development of Safety, Occupational Health and Purpose and Importance of Safety, Occupational Health and Safety Concepts in the area, Overview of the Occupational Health and Safety, work accidents, occupational diseases, to be taken against the Work Accidents and Occupational Diseases precautions, accidents at work and Costs arising from occupational diseases will be thought.

Course Name: AIE302 Introduction to Machine Learning
Lecture Hours and ECTS:(4 - 2) 6
Course Description: This course provides a broad introduction to machine learning and statistical pattern recognition. Topics include: supervised learning (generative/discriminative learning, parametric/non-parametric learning, neural networks, support vector machines); unsupervised learning (clustering, dimensionality reduction, kernel methods); learning theory (bias/variance tradeoffs, practical advice); reinforcement learning and adaptive control. The course will also discuss recent applications of machine learning, such as to robotic control, data mining, autonomous navigation, bioinformatics, speech recognition, and text and web data processing.

Course Name: ECC303 Data Communication and Networking
Lecture Hours and ECTS:(4 - 2) 6
Course Description: The aim of this course is to give details of computer networking and data communications. Introduction to Computer Networks and Data Communications, Fundamentals of Data and Signals, Conducted and Wireless Media, Making Connections, Making Connections Efficient, Errors, Error Detection and Error Control, Local Area Networks, Introduction to Metropolitan Area Networks and Wide Area Networks, The Internet, Voice and Data Delivery Networks, Network Security, Network Design and Management subjects will be covered during the semester.

Course Name: AIE304 Learning in Humans
Lecture Hours and ECTS:(3 - 0) 6
Course Description: The aim of this unit is to outline the basic learning mechanisms that allow us to organise our behaviour and adapt to our environment.

Course Name: AIE306 Deep Learning
Lecture Hours and ECTS:(3 - 2) 6
Course Description: This course is an introduction to deep learning, a branch of machine learning concerned with the development and application of modern neural networks. basic neural networks, convolutional and recurrent network structures, deep unsupervised and reinforcement learning, and applications to problem domains like speech recognition and computer vision subjects will be covered.

Course Name: ECC440 Occupational Health and Safety II
Lecture Hours and ECTS:(2 - 0) 4
Course Description: The aim of the course is to introduce students about safety applications in real life practices. Occupational Health and Historical Development of Safety, Occupational Health and Purpose and Importance of Safety, Occupational Health and Safety Concepts in the area, Overview of the Occupational Health and Safety, work accidents, occupational diseases, to be taken against the Work Accidents and Occupational Diseases precautions, accidents at work and Costs arising from occupational diseases.

Course Name: AIE401 Introduction to Robotics
Lecture Hours and ECTS:(3 - 2) 7
Course Description: The aim of this course is to introduce the student about the basic

components of Robotics. The subjects that will be covered during the semester are: Basic components of robot systems; coordinate frames, homogeneous transformations, kinematics for manipulator, inverse kinematics; manipulator dynamics, Jacobians: velocities and static forces , trajectory planning, Actuators, Sensors, Vision, Fuzzy logic control of manipulator and robotic programming.

Course Name: AIE403 Computer Vision
Lecture Hours and ECTS:(3 - 2) 7
Course Description: This course provides an introduction to computer vision, including fundamentals of image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification, scene understanding, and deep learning with neural networks.

Course Name: AIE491 Senior Project I
Lecture Hours and ECTS:(3 - 0) 6
Course Description: The aim of the course is to give senior design experience to students. This course is the first part of design project. The senior design project can be a project under the supervision of a faculty member. Oral presentations and written reports are required.

Course Name: AIE492 Senior Project II
DersinHaftalık Ders Uygulama Saati ve AKTS:(4 - 0) 7
Course Description: The aim of the course is to give senior design experience to students. This course is the second and final part of design project. Oral presentations and written reports are required.

Course Name: ECC429 Engineering Ethics
Lecture Hours and ECTS:(3 - 0) 6
Course Description: The aim of the course is to provide knowledge about engineering ethics. An Overview of Ethics, Ethics for IT Professionals, Computer and Internet Crime, Privacy, Freedom of Expression, Intellectual Property, Software Development, The Impact of AI on the Quality of Life, Social Networking, Ethics of AI and IT Organizations.

Course Name: AIE402 Speech Processing
Lecture Hours and ECTS:(3 - 2) 7
Course Description: Speech Processing offers a practical and theoretical understanding of how human speech can be processed by computers. It covers speech recognition, speech synthesis and spoken dialog systems. The course involves practicals where the student will build working speech recognition systems, build their own synthetic voice and build a complete telephone spoken dialog system.

TECHNICAL ELECTIVE COURSES

Course Name: AIE411 Advanced Data Analysis
Lecture Hours and ECTS:(3 - 2) 5
Course Description: In this course a number of advanced and multivariate data analysis methods will be introduced and lead students through their background, rationale, practical application and interpretation, using step by step explanations. Knowledge of these will help students understand, evaluate and draw informed conclusions from the complex analyses of other researchers, address how they will utilise the data in projects.

Course Name: AIE412 Search Engines
Lecture Hours and ECTS:(3 - 2) 5
Course Description: Information retrieval is the process through which a computer system can respond to a user's query for text-based information on a specific topic. IR was one of the first and remains one of the most important problems in the domain of natural language processing (NLP). Web search is the application of information retrieval techniques to the largest corpus of

text anywhere -- the web -- and it is the area in which most people interact with IR systems most frequently.

Course Name: AIE413 Human-Robot Interaction
Lecture Hours and ECTS:(3 - 2) 5
Course Description: This course will focus on the emerging field of Human-Robot Interaction (HRI). This multidisciplinary research area draws primarily from: robotics, AI, human-computer interaction, and cognitive psychology. The primary goal of HRI is to enable robots to successfully interact with humans. This course will cover a variety of topics related to social intelligence: learning, teamwork, planning, dialog, emotion, embodied intelligence, among others. For each topic, readings and lectures will cover (1) what's known about how this ability arises in human intelligence, and (2) state-of-the-art approaches to building computational systems with this type of social intelligence. Assignments will be a combination of readings, discussions, team problem solving sessions, and a team final project involving the implementation of a Human-Robot Interaction system.

Course Name: AIE414 Deep Reinforcement Learning and Control
Lecture Hours and ECTS:(3 - 2) 5
Course Description: Aim of this course is to implement and experiment with existing algorithms for learning control policies guided by reinforcement, demonstrations and intrinsic curiosity. Evaluate the sample complexity, generalization and generality of these algorithms. Be able to understand research papers in the field of robotic learning. Try out some ideas/extensions on your own. Particular focus on incorporating sensory input from visual sensors.

Course Name: AIE415 Mobile Robot Programming
Lecture Hours and ECTS:(3 - 2) 5
Course Description: This course is an extensive hands-on introduction to the concepts and basic algorithms needed to make a mobile robot function reliably and effectively. This is a lab course with emphasis on hands-on learning. Students will get experience in this course in addition to some theory. Lectures are focused on the content of the next lab. There is a sequence of labs and they build on each other. The course will culminate with an individually implemented project. Students will also be introduced to the basics of doing research in this course.

Course Name: AIE416 Autonomous Agents
Lecture Hours and ECTS:(3 - 2) 5
Course Description: The course aims at giving the students an understanding of design principles for autonomous systems, both robots and software agens, and also gives students the opportunity to apply their knowledge in practice through the construction of a simple autonomous robot.

Course Name: AIE417 Introduction to Quantum Computing
Lecture Hours and ECTS:(3 - 0) 5
Course Description: This course aims to provide a first introduction to quantum computing. The paradigm change between conventional computing and quantum computing will be highlighted, and several basic quantum algorithms will be introduced. The implications of quantum computing on fields such as computer security and machine learning will be discussed.

Course Name: AIE418 Computer Animation & Visualization
Lecture Hours and ECTS:(3 - 2) 5
Course Description: In this course, Principles of interactive computer graphics; Topics include fundamental techniques in graphics, graphic systems, graphic communication, geometric modeling, rendering, computer animation, visualization and virtual reality and other recent developments in computer graphics subjects will be covered during the semester.

Course Name: AIE419 Algorithmic Game Theory and its Applications
Lecture Hours and ECTS:(3 - 2) 5
Course Description: Broad survey of topics at the interface of theoretical computer science and economics. Introduction to auction and mechanism design, with an emphasis on computational

efficiency and robustness. Introduction to the "price of anarchy", with applications to networks. Algorithms and complexity theory for learning and computing Nash and market equilibria. Case studies in Web search auctions, wireless spectrum auctions, matching markets, network routing, and security applications.

Course Name: AIE420 Fuzzy Systems
Lecture Hours and ECTS:(3 - 2) 5
Course Description: Fuzzy set theory, rules, reasoning and inference systems. Regression and optimization, derivative-based optimization – genetic algorithms, simulated annealing, Neural Networks, adaptive networks.