

General Education:

Code: MHK 1101

Course: Modern History of Kazakhstan

Author: Meldibekova Zulfiya Abdikhalikovna

Credits: 3

Hours: 135

Semester: 1-2

Prerequisites: History of Kazakhstan, World History

Postrequisites: “Literature”, “Fundamentals of Law”, “Geography”, “Sociology”.

Course Description: The Modern History of Kazakhstan is a part of the history of humanity, the history of Eurasia and Central Asia. The Modern History of Kazakhstan - the period in which a holistic study of historical events, phenomena, facts, processes, revealing the historical patterns that have taken place on the territory of the Great Steppe in the twentieth century to the present day. Methods of conducting classes include presentations, discussions, debates, roundtables, business games, case studies, traditional and other techniques

Learning outcomes: By the end of the course, the students will be able to:

- to link and compare individual phenomena and events of the past with the general paradigm of the world historical development of human society
- to objectively examine and explain historical events
- to determine the features and value of the Kazakhstan development model;
- to discuss and generalize social and ethical values based on public opinion, traditions, customs, social norms and orient oneself to them in their professional life;

Code: Fhi 2102

Course: Philosophy

Author: Tuleubekov Assyl Serikovich

Credits: 3

Hours: 135

Semester: 4

Prerequisites: History of Kazakhstan, Ecology, Sociology, Economical Theory

Postrequisites: Philosophical Anthropology, Political Science, Fundamentals of Law, Psychology.

Course Description: The object of studying discipline is the philosophy as the special form of spiritual works in its cultural-historical development and modern sounding. The basic directions and problems of the world and native philosophy are studied. Philosophy - the special form of knowledge of the world, creating system of knowledge of general principles and bases of life of the person, about essence characteristics of the attitude of the person to the nature, society and spiritual life, in its all main direction.

1. Philosophy, its subject & functions. Philosophy in cultural-historical aspect. Philosophy is the system of knowledge
2. Phenomenon of philosophy in the east culture. The problem of person in the ancient Indian philosophy (mythological, Brahmanism, the Buddhism) and in the ancient Chinese philosophy (mythological aspects, Confucianism, Taoism).
3. Philosophy in antique culture. Essence of an ancient art and philosophy, stages of becoming of an ancient philosophy
4. Phenomenon of philosophy in the medieval European culture. Arabian-Muslim philosophy in context of medieval Muslim culture. Essence of medieval philosophy on 3 stages: apologetics, patristic and scholasticism
5. Philosophy in culture of Renaissance & Reformation epoch. Consideration essence Renaissance philosophies, its basic peculiarities of pantheism, heliocentric, anthropologic, humanism

6. Early Modern European philosophy in culture of the New time. Essence of the West-European philosophy of given time and - main problem there is a creation of new methodology of science.
 7. German classical philosophy. Theory of cognition in the philosophies of Kant, Fichte, Shelling, Hegel, Feuerbach.
- Midterm Exam
8. The western European philosophy in culture of XIX century. The main problem of philosophy of XIX century
 9. Russian philosophy in context of Russian culture of XIX-XX c. Phenomenon of philosophy in the Kazakh culture.
 10. The western philosophy in context of culture of XX c. & the beginning of XXI c. Phenomenology, existentialism, structuralism. Postmodernism
 11. The problem of being and Logos. Being is the central category of philosophy. Being of the world, things
 12. Man as a philosophical problem. Philosophical anthropology. Being of the person as somatic and spiritual
 13. Gnoseology and philosophy of mind. Process of cognition. Degrees of individual cognition
 14. Social philosophy. The difficulties and problems of the transition to the market economy.
 15. Phenomenon of culture and philosophy of globalization. Culture is the substance of Man's in a man. Culture exists as mass as elite.

Learning outcomes: By the end of the course, the students will be able to:

By the end of this course the students will be able to:

- apply methods of discussion, polemic and dialogues
- demonstrate mastery of philosophical categories, analysis and techniques to the advanced level;
- apply concepts and techniques in evaluating social problems; think clearly, sequentially and logically, as required for critical analysis of quantitative problems, in particular social problems; process and evaluate effectively both theoretical and real-life quantitative data
- be qualified in independently study special sociological literature; use computer technologies in sociological research.

Code: IYa 1103

Course: GE-EPP Elementary

Author: A.K. Kaldarova

Credits: 4

Hours: 135

Semester: 1

Prerequisites: Entrance test

Postrequisites: English for Professional Purposes

Course Description: FL 1103 - GE/EPP Elementary is a Professional English course offered to the 1st year students of IITU majoring various specialties connected with Information Technologies. The course is designed for students with a basic knowledge of general English who now require an elementary English course in this specific field. It includes topics that reflect the latest developments in information technology, with the specialist vocabulary making them immediately relevant to students' needs. The course also includes a strong skills-oriented grammar syllabus. The course aims to develop skill that learners need to succeed in their chosen field.

Learning outcomes: By the end of the course, the students will be able to:

- differentiate and use such grammar issues such as: Present Simple, Adjectives and adverbs, Present Continuous, Future Simple and Past Simple;
- show proficiency in recognizing familiar words, interpreting and understanding authentic oral speech as: Working in the IT industry, Computer systems and IT support, security and safety;

- express opinion, present ideas on the above topics;
- skim, scan and discuss texts on the topics under study;
- recognize and apply professional IT vocabulary on the topics studied;
- write a paragraph on covered issues.

Code: KL 1104

Course: Қазақ тілі

Author: А.Т. Ақжыжанова

Credits: 6

Hours: 135

Semester: 1-2

Prerequisites: none

Postrequisites: none

Course Description: Өмірде тұрмыстық және кәсіби деңгейде күнделікті тілдесуге арналған лексикалық тақырыптар мен сауатты жазуға, естіп-тындағанын, оқығанын түсінуге, сөйлемдер мен мәтіндерді дұрыс, жүйелі құруға қажетті фонетикалық, морфологиялық, синтаксистік, стилистикалық ережелер мен заңдылықтар.

Сөйлем түрлері. Салалас, сабақтас, аралас құрмалас сөйлем түрлері, жасалу жолдары. Сөйлемдердің түрлері мен құрылысы. Сөйлемдегі сөздердің орын тәртібі. Пунктуация ережелері.

Learning outcomes: By the end of the course, the students will be able to:

Қазақ тілінде өз ойын жеткізе алу, мәнерлеп сөйлеу, көзқарасын дәлелдей алу, қабылдаған шешімін еркін жеткізе білу, сауатты жаза білу, әңгімені қолдау, негізгі ақпараттарды жинап, талдап, қолдана білу, хабарлама жасау, өз бетінше зерттеу жүргізу, түсіндірме сөздіктерді пайдалана білу.

Code: RL 1104

Course: Русский Язык

Author: Еркебекова Э.К. – к.ф.н., асс.проф.

Credits: 3

Hours: 135

Semester: 2

Prerequisites: Русский язык

Postrequisites: Профессиональный русский язык

Course Description: Дисциплина «Русский Язык» занимает особое место в системе подготовки бакалавров с инженерным образованием. Для студентов технического вуза изучение профессионального русского языка – это не только совершенствование навыков и умений, полученных в школе, но и средство овладения будущей специальностью.

Learning outcomes: By the end of the course, the students will be able to:

- может интерпретировать лексико-грамматический материал;
- может применять все изученные виды монологической речи: описание, повествование, рассуждение в разных комбинациях, соблюдая логическую последовательность и адекватность языковых средств;
- может создавать диалоги и обмениваться мнениями в определенных коммуникативных ситуациях повседневного общения;
- может слушать и понимать устную информацию с последующей передачей её содержания с разной степенью компрессии и использовать её в зависимости от целевых установок;
- может вести дискуссию или участвовать в диспуте, готовить выступление на заданную тему;
- может дифференцировать тексты различных стилей и соотносить их с конкретной коммуникативной ситуацией;

- может читать и понимать тексты любого содержания, в зависимости от характера и стиля текста и целевых установок разные типы речи;
- может составлять связные тексты, писать сочинения в разных жанрах, соблюдая структуру построения, развернутую аргументацию, правильность оформления.

Code: ICT 1105

Course: Information and Communication Technologies

Author: Aiman Nickolayevna Moldagulova, PhD

Credits: 3

Hours: 135

Semester: 1

Prerequisites: None

Postrequisites: Operating Systems. Database Systems. Network Systems. Internet Technology. Programming Languages

Course Description: Information and communication technologies (ICT) is regarded as modern methods and means of communication of people in a normal and professional activities with the help of information technologies for the search, collection, storage, processing and dissemination of information.

The discipline of "ICT" serves for formation at students of a certain outlook in the information sphere and the modern information culture, i.e. ability to work purposefully with information, professionally using for receiving, processing, transmission and its storage.

This course exposes students in a top-level experience to computer hardware, software and communication systems. Students learn the functionality of hardware, software and network components as well as suggested best practices in maintenance and safety issues. Through hands-on and laboratories activities, students learn how to assemble and configure a computer as well as install operating systems and diagnostic application utilities. In addition, an introduction to networking is included. Students should be proficient in daily computer use (such as downloading and installing software from the Internet) and should be familiar with computer terms.

Learning outcomes: By the end of the course, the students will be able to:

- define the main tendencies in the field of information communication technologies;
- use information resources for search and information storage;
- work with electronic spreadsheets to execute consolidation of data and to build diagrams;
- work with databases;
- apply methods and means of information protection;
- design and create simple web sites;
- process vector and bitmap images;
- create the multimedia presentations;
- use different social platforms for communication.

Code: IE 4106

Course: Internet Entrepreneurship

Author: Beibut Amirgaliyev, associate professor

Credits: 3

Hours: 135

Semester: 5

Prerequisites: none

Postrequisites: Managing Technical People (SDP11)

Course Description: This course is designed primarily to provide an overview of entrepreneurship, develop an entrepreneurial frame of mind and learn the rudiments of how to

differentiate an idea from an opportunity. Students come up with a business idea and explore its potential for becoming a viable business. They learn to do market research and experience first-hand the rewards and difficulties in dealing with people in the real world. They will meet entrepreneurs and business professionals as part of the course and learn how to make effective presentations - both written and oral. Other important aspects of the course include self-assessment to determine one's strengths and weaknesses, understanding the "magic" of leadership and gaining an entrepreneurial perspective on life.

Learning outcomes: By the end of the course, the students will be able to:

- Define basic terms
- Identify the elements of success of entrepreneurial ventures,
- Explain entrepreneurial project and its essential elements,
- Consider the legal and financial conditions as well as the importance of the entrepreneurial infrastructure for starting a business venture
- Evaluate the effectiveness of different entrepreneurial strategies
- Interpret their own business plan.

Code: EIS 4107

Course: Ecology and Industrial Safety

Author: Malgazhdarova Makpal Kabdullaevna

Credits: 2

Hours: 135

Semester: 7

Prerequisites: A school course of Fundamentals of safety activities

Postrequisites: Occupational health and safety of life

Course Description: The importance of studying the course " Ecology and Industrial Safety " due to the need to be prepared to meet all emergencies, and know how to carry out first aid in case of accidents and injuries. These skills and knowledge will be delivered during the presentation of new material, discussions and problem-solving.

List of the themes

1. Introduction. Basic definitions and occupational safety.
2. The legislative and regulatory framework of safety and life.
3. Management of labor protection.
4. Occupational injuries and occupational diseases, methods of their analysis.
5. Industrial sanitary.
6. The working environment.
7. Sound and its characteristics.

Midterm Exam

8. Electromagnetic radiation.
9. Safety Directions.
10. Fire safety.
11. Emergency situations of peacetime and wartime.
12. Stability of objects of managing work.
13. Engineering protection of the population.
14. Means of individual Protection.
15. Disaster management.

Learning outcomes: By the end of the course, the students will be able to:

- list the basics of physiology and rational operating environment;

- describe anatomical and physiological effects of human exposure to traumatic, harmful and damaging factors;
- identify of traumatic, harmful and damaging factors of emergencies;
- list the issues of formation of healthy habits in childhood;
- memorize the foundations of medical knowledge and the rules of first aid.
- provide a safe and environmentally friendly operation of systems and facilities;
- provide first aid when the lesions caused by the influence of extreme environmental factors, technological and other negative factors.

Code: FL 1108

Course: GE/EPP Pre-intermediate

Author: Ainur Adilbekovna Zhaparova

Credits: 4

Hours: 135

Semester: 1

Prerequisites: Placement test

Postrequisites: English for Professional Purposes Intermediate

Course Description: FL 1108- GE/EPP Pre-Intermediate is a course of Professional English offered to the 1st year students of IITU. It focuses on such topic of professional interest as Computers and work, Jobs in ICT, Types of computer systems, Computer essentials, Operating systems and GUI, Word processing, Cyberspace: security and crime, etc. It is designed to raise the students' language awareness, improve their speech skills and communication competences in Professional English. The language training is communicative, interactive, student-centered, outcome-oriented and heavily reliant on students' self-study work. The latter is organized as T/SIS (GW2, TM exercises, paragraph writing and project).

Course duration: 45 classrooms and 15 TSIS hours, 15 weeks: 4 classroom hours a week

Learning outcomes: By the end of the course, the students will be able to:

- differentiate and use such grammar issues such as: Present and Past Tenses, Un/count nouns, Articles, Adj/Adv., Comparisons, Quantifiers, Relative Pronouns;
- recognize and apply general and professional vocabulary on the topics studied;
- recognize familiar words, interpret and understand authentic oral speech while listening on the topics studied;
- speak fluently on such issues as Computers and work, Jobs in ICT, Types of computer systems, Computer essentials, Operating systems and GUI, Word processing, Cyberspace: security and crime;
- express opinion, propose solutions, present ideas on the above topics;
- skim for gist and scan texts for specific information, and guess the meaning of new words and phrases from context;
- write a paragraph;
- share responsibilities among project group members, manage the time properly and work to the deadlines.

Basic courses:

Code: PKRL 2201

Course: Кәсіби Қазақ Тілі

Author: Ж.С. Манғышева, сениор- лектор

Credits: 2

Hours: 135

Semester: 3

Prerequisites: Қазақ тілі

Postrequisites: Іскерлік қазақ тілі

Course Description: Кәсіби қазақ тілі курсы кәсіби бағдарлы мәтіндердегі негізгі ойды түсіну, БАҚ-тағы күнделікті жаңалықтан кәсібіне қатысты ақпараттарды саралап жеткізу, мамандығы бойынша жалпы тақырыптарға әңгімелесе алу, өзін қызықтыратын тақырыптарға ойын жаза алу, өз мамандығы жайлы жоспарлап, болашақ қызметі туралы баяндай алу. Сөйлемдер мен мәтіндерді дұрыс, жүйелі құруға қажетті фонетикалық, морфологиялық, синтаксистік, стилистикалық ережелер мен заңдылықтарды еске түсіру, сақтау, дұрыс пайдалану.

Learning outcomes: By the end of the course, the students will be able to:

- кәсіби деңгейде ойын жеткізе алу, көзқарасын дәлелдей алу,
- қабылдаған шешімі мен ойларын еркін, жүйелі түрде жеткізу,
- сауатты жазу және мәнерлеп сөйлей білу,
- негізгі ақпараттарды жинай білу, хабарлама жасау, өз бетінше зерттеу жүргізу,
- статистикалық мәліметтерді зерделеп, орынды қолдана білу,

түсіндірме сөздіктерді пайдалана білу.

Code: PKRL 2201

Course: Профессиональный Русский Язык

Author: Алиева Д.А. – к.п.н., ассоц.-проф

Credits: 2

Hours: 135

Semester: 3

Prerequisites: R L 1104 «Русский язык»

Postrequisites: none

Course Description: Дисциплина «Профессиональный русский язык» занимает особое место в системе подготовки бакалавров с инженерным образованием. Для студентов технического вуза изучение профессионального русского языка – это не только совершенствование навыков и умений, полученных в школе, но и средство овладения будущей специальностью.

Learning outcomes: By the end of the course, the students will be able to:

- интерпретировать терминологическую лексику;
- применять изученные виды профессиональной речи, соблюдая логическую последовательность и адекватность языковых средств;
- создавать профессионально-ориентированные тексты любого уровня сложности;
- прогнозировать цель и задачи научных текстов по заголовку;
- объяснять профессиональную лексику;
- промаркировать в тексте по специальности профессиональную лексику;
- классифицировать объекты исследования;
- воспринимать специализированные тексты на слух, формулируя тезисы ;
- вести дискуссию или участвовать в диспуте, готовить выступление на заданную тему;
- дифференцировать жанры и виды научных и профессиональных текстов;
- анализировать профессиональный дискурс и синтезировать;
- строить научный текст, описывающий актуальные вопросы специальности;
- составлять связные тексты, писать сочинения в разных жанрах, соблюдая структуру построения, развернутую аргументацию, правильность оформления;
- обобщать полученную информацию об особенностях первичных и вторичных текстов с целью;
- защищать собственную позицию в научной дискуссии.

Code: POFL 2202

Course: EPP/GE Intermediate I

Author: Yermakova Vera Alexandrovna, Candidate of Philology

Credits: 4

Hours: 135

Semester: 1

Prerequisites: Placement test Intermediate (B1)

Postrequisites: Professional/General English Intermediate II

Course Description: POFL 2202 EPP/GE Intermediate I course is offered to the 1st year students of IITU. It focuses on such topics as University life, best practices of learning, soft skills and computer essentials. It is designed to raise the students' awareness of the university life basics/goals and technical aspects of IT to build up their professional English language competence. The language training is communicative, interactive, student-centered, outcome-oriented and heavily reliant on students' self-study work. The latter is organized as TSIS (summary writing) and SIS (self-checked language exercises and project work).

Learning outcomes: By the end of the course, the students will be able to:

- differentiate and use such grammar phenomena as Tenses and Questions;
- build up and appropriately use general and professional vocabulary on the topics studied;
- understand authentic speech on the topics studied;
- skim, scan, discuss and analyze texts on the topics under study;
- make an effective presentation of the project (Breakthrough in IT);
- summarize texts.

Code: Fhy203

Course: Physics

Author: Sandybeck K. Kunakov, Associate professor

Credits: 2

Hours: 135

Semester: 2

Prerequisites: Algebra and Geometry, the mathematical analysis, probability of theory and the mathematical statistics.

Postrequisites: Theory of electric circuits, microelectronics, fiber optic communication, local and global network (LAN, WAN).

Course Description: Physics is an algebra-based, introductory physics course. Students cultivate their understanding of Physics through inquiry-based investigations as they explore these topics: kinematics; dynamics; circular motion and gravitation; energy; momentum; simple harmonic motion; torque and rotational motion; electric charge and electric force; DC circuits; thermodynamics, and mechanical waves, fluids, field, and potential; electric circuits; magnetism and electromagnetism induction; geometric and physical optics; and quantum, atomic, and nuclear physics and sound. Students cultivate their understanding of Physics through inquiry-based investigations as they explore these topics.

Learning outcomes: By the end of the course, the students will be able to:

- Apply the basic laws of classical mechanics, theory of gravitation, special theory of relativity, electromagnetic phenomena, quantum mechanics, thermodynamics, electromagnetic phenomena and nuclear physics to get professional skills in science and technology;
- Evaluate relationships of fundamental laws of Newtonian mechanics and theory relativity in analyses the relative motion of physical objects;
- Demonstrate the validity of energy conservation law in different parts of the course from mechanics till electromagnetic waves appearance from electron transition within atomic systems;
- Demonstrate the skills to evaluate to nuclear reactors operational characteristics and safety insurance gained from theory relativity and nuclear atomic structure;

- Demonstrate the ability to use basic mathematical tools commonly used in physics, including elementary probability theory, differential and integral calculus, vector calculus, ordinary differential equations, partial differential equations, and linear algebra in solution of definite physical problem in the course area;
- Evaluate statistical and systematic errors in physics basic laboratory works including distinguishing, and representing data graphically.

Code: Mat 1204

Course: Mathematics – 1

Author: Abdikalikova Z.T., assistant-professor

Credits: 3

Hours: 135

Semester: 1

Prerequisites: Elementary Mathematics: Algebra, Geometry, Beginning of Analysis and Trigonometry

Postrequisites: Mathematics - 2, Mathematics – 3, Discrete Mathematics

Course Description: Mathematics is a foundational course at IITU; it plays an important role in the understanding of science, engineering, economics, and computer science, among other disciplines. This introductory calculus course covers matrix theory, systems of linear equations, vector theory, analytical geometry, limit and differentiation of functions of one variable, with applications. After completing this course, students should have developed a clear understanding of the fundamental concepts of algebra, geometry and single variable calculus and a range of skills allowing them to work effectively with the concepts.

Learning outcomes: By the end of the course, the students will be able to:

- Solve the systems of linear equations, using matrix operations
- Apply and explain the arithmetic operations and laws of matrix algebra, decide whether a quadratic matrix is invertible or not, calculate inverses and solve affine matrix equations.
- Apply and graphically illustrate the arithmetic operations for vectors in the plane, in 3-space and in R^n
- Formulate and geometrically describe equations for straight lines and planes in 3-space, on parametric as well as non-parametric form
- Apply the scalar and vector products for evaluations of angles, lengths/distances, areas and volumes in geometrical applications that can be illustrated by vectors
- Solve problems involving lengths and distances in the plane, including midpoint and point-of-division formulas
- Sketch the graph of a function using asymptotes, critical points, the derivative test for increasing/decreasing functions, and concavity.
- Apply differentiation to solve applied max/min problems and related rates problems.

Code: Mat 1205

Course: Mathematics- 2

Author: Abdikalikova Z.T., Assistant-professor

Credits: 3

Hours: 135

Semester: 2

Prerequisites: Elementary Mathematics: Algebra, Geometry, Beginning of Analysis and Trigonometry, Mathematics 1

Postrequisites: Mathematics 3, Discrete Mathematics

Course Description: Mathematics plays an important role in engineering and technical sciences. It is a powerful tool for solving applied problems and the universal language of science, as well as an element of general culture. Without modern mathematics with its advanced logic and computing tools it is not possible to progress in various fields of human activity. Technical

sciences make extensive use of mathematics. The modern scientist or engineer must have deep knowledge in classical and modern mathematical methods of investigation that can be applied in his area. In order to be able to successfully apply mathematical methods in the study it is necessary, of course, first of all to have the necessary knowledge and to know how to deal with the mathematical concepts, and finally to know the limits considered acceptable to be able to use of the mathematical model. For a correct formulation of the problem, to evaluate its data, to highlight the significant of them, and to choose methods of its solution it is necessary to have more mathematical intuition.

Learning outcomes: By the end of the course, the students will be able to:

- build mathematical models using the tools of the calculus;
- put mathematical problems for models of the given process;
- select suitable mathematical methods and algorithms of the problem solution;
- apply numerical methods to the problem solution, using modern computer facilities;
- carry out qualitative mathematical researches.

Code: Mat 2206

Course: Mathematics- 3

Author: Darkenbayeva Gulsim Spandiyarovna, master of natural sciences

Credits: 3

Hours: 135

Semester: 1

Prerequisites: Mathematical Analysis, Algebra and geometry, Discrete mathematics

Postrequisites: Mathematical Modeling, Finance, Actuarial Mathematics, Physics , Programming Technology

Course Description: The course Mathematics 3 focuses on probability and statistics of any events, and on the relationship between mathematics and programming, operation systems through an interdisciplinary program of study covering the cross-section of mathematical analysis, modern statistical techniques and economic theory which deepens the students' mathematical understanding of probability, practical market issues and develops their logical and algorithmic thinking skills. The course provides students with the mathematical tools to be applied to computer problems, advanced methods of studying and solving mathematical problems. Strong backgrounds in calculus, linear algebra are recommended.

Learning outcomes: By the end of the course, the students will be able to:

- define basic probability axioms and rules and the moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.
- derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions.
- calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables.
- to translate real-world problems into probability models.

Code: ADSP 1207

Course: Algorithms, data structures and programming

Author: Pachshenko Galina Nikolaevna, Associate Professor, candidate of technical science

Credits: 3

Hours: 135

Semester: 1

Prerequisites: Mathematics

Postrequisites: Object-Oriented Programming

Course Description: The course "Algorithms, data structures and programming" is designed for studying of algorithms and programs development to solve different problems. For this purpose,

program structure, principles of construction of algorithms and programs, methods of solving, algorithmization, programming, debugging and implementation of programs, using the language C++ are considered.

Learning outcomes: By the end of the course, the students will be able to:

- to develop block diagrams of various algorithms using general principles of algorithm construction, data structures, operators and basic algorithmic construction in C++.
- to identify types of variables for solving practical tasks.
- to solve practical tasks by creating programs on C++ in good style.
- to compare and contrast the different ways of solving a problem.
- to explain the documentation of created program using comments.

Code: ITI 3208

Course: IT-infrastructure

Author: PhD, Assistant professor, Rakhmetulayeva S.B

Credits: 3

Hours: 135

Semester: 5

Prerequisites: “Algorithms, Data structures and Programming”, “Computer networks”, “Web technologies”, “Designing client-server applications”, “Information System Interfaces”

Postrequisites: Diploma project

Course Description: This course is about information technology infrastructure in a business environment, including inter-networked data communications and distributed data processing. Topics covered include, the business imperatives for distributed systems, systems architectural design (client/server; distributed processing, etc) layered architecture models (TCP/IP, OSI, etc): key network models and technologies, security issues related to architecture, design and technology, network configuration and management techniques.

Learning outcomes: By the end of the course, the students will be able to:

- analyse data communications and networking issues in business environments
- analyse the issues associated with business data networks security and analyse possible networking solutions
- apply modern technologies for modelling business processes
- design efficiently and support the IT infrastructure
- synthesize the theoretical, technical and management issues that deliver ICT services to an organization

Code: DM 1209

Course: Discrete Mathematics

Author: Kurmanbaev D.M., lector, master of sciences

Credits: 3

Hours: 135

Semester: 1

Prerequisites: Pre-Calculus, College Algebra & Geometry

Postrequisites: CSA 3211 Computer Systems Architecture

Course Description: Discrete mathematics is the part of mathematics devoted to the study of discrete objects (Here discrete means consisting of distinct or unconnected elements). More generally, discrete mathematics is used whenever objects are counted, when relationships between finite (or countable) sets are studied, and when processes involving a finite number of steps are analyzed. A key reason for the growth in the importance of discrete mathematics is that information is stored and manipulated by computing machines in a discrete fashion.

Learning outcomes: By the end of the course, the students will be able to:

- demonstrate mastery of mathematical concepts, analysis and techniques to the advanced level;
 - understand and create mathematical arguments;
 - use computer technologies and techniques;
 - think clearly, sequentially and logically, as required for critical analysis of mathematical problems;
 - process and evaluate effectively both theoretical and real-life quantitative data;
 - select suitable mathematical methods and algorithms for the solution of a problem;
- carry out qualitative mathematical research.

Code: OS 2210

Course: Operating Systems

Author: Rakhmetulayeva S.B., PhD

Credits: 2

Hours: 90

Semester: 3

Prerequisites: Information and Communication Technologies

Postrequisites: Architecture of computer systems

Course Description: This course will provide an introduction to operating system design and implementation. The course will start with a brief historical perspective of the evolution of operating systems over the last fifty years, and then cover the major components of most operating systems. This discussion will cover the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), file systems, and operating system support for distributed systems. Bash language skills, network management, network security.

Learning outcomes: By the end of the course, the students will be able to:

- describe the main responsibilities of a contemporary operating system (OS) and to explain the history leading to their current form
- examine the important problems in operating system design and implementation
- understand the goals of standardization of OS (and other) interfaces
- develop and write bash scripts for Linux OS
- demonstrate basic knowledge of OS processes
- allocate OS resources correctly
- implement fundamental OS structures
- identify and process command-line arguments.

Code: CSA 3211

Course: Computer Systems Architecture

Author: Rakhmetulayeva S.B

Credits: 2

Hours: 90

Semester: 5

Prerequisites: Operating Systems

Postrequisites: Robotics

Course Description: The course “Computer Systems Architecture” presents basic computer hardware element concepts equipment principles, and computer performance evaluation techniques that are used in computer system design processes from an assembler programmer, a computer architect and a logic designer’s point of view. The course contains details of components necessary to understand the concepts of machine computing.

Learning outcomes: By the end of the course, the students will be able to:

- describe functions of the basic building blocks of a digital system;
- make critique and assessment on various architectures and the design concepts for analyzing computer systems;
- explore the basic operations of cache and main memory, I/O operations, bus, interrupt and peripheral devices as well as assessing the performance of different designs;
- write low-level programs for bitwise operation, function pointer, call-back function, and event interrupt using C or C++ language.

Code: FLS 212

Course: Foreign language for STEM

Author: N.Utelbayeva, senior- lecturer

Credits: 3

Hours: 135

Semester: 2

Prerequisites: Business English Upper/Intermediate

Postrequisites: Research Reading and Writing

Course Description: The course is designed to help the students develop their English language competence for their current and future academic studies. The course is focused on building up general/academic vocabulary, raising their grammar accuracy and developing IELTS-format Listening, Reading, Writing and Speaking skills. Intensive classwork is accompanied by ample self-study activities in the form of language and grammar exercises in SIS, use of the studied grammar (TLU) in oral speech and academic writing (TSIS).

Learning outcomes: By the end of the course, the students will be able to:

- comprehend academic texts, guess the meaning of unknown words from the context;
- speak on a range of familiar general topics;
- write argumentative essays, interpret statistical information;
- raise the target vocabulary (Phrasal verbs) and grammar (Level 3) accuracy;
- search for, compare, contrast, compress, generalize and process information;
- move to the higher level of the English language mastery

Code: OOP 2213

Course: Object-Oriented Programming

Author: Altaibek Aizhan, assistant professor, PhD in Computer Science

Credits: 3

Hours: 135

Semester: 3

Prerequisites: Fundamentals of Information Systems

Postrequisites: Application development on MS .NET Framework platform (MS prog 1), Development of Web components on the Java EE platform (Java 1)

Course Description: This course is designed to study on how to develop console or windows .NET applications using C# programming language using object-oriented programming concepts. Topics of the course include .NET paradigm, C# programming, file processing, exceptions, structures, collections, object-oriented programming concepts, drawing.

All laboratory and home works will be performed on Microsoft Visual Studio 2010 or newer.

Learning outcomes: By the end of the course, the students will be able to:

- create and use classes, objects, polymorphism, encapsulation, inheritances in C# application;
- develop/install/configure console/windows .NET applications;
- improve object-oriented programming skills using the C#.NET;
- apply the virtual methods, interfaces and abstract classes;
- use aggregation and composition concepts in .NET applications;

- develop graphics in .NET applications;
- process error exceptions in .NET applications.

Code: ISDP 2214

Course: Information security and data protection

Author: Karlygash Mukhitova, Senior - Lecturer, MSc Cyber Security

Credits: 3

Hours: 135

Semester: 4

Prerequisites: Fundamentals of Information Systems

Postrequisites: Network Communication and Security (SDP09)

Course Description: The Information Security module is centered round a core Security theme that introduces students to fundamental security topics that arise in the design, analysis, and implementation of networked and distributed systems. Subsidiary themes allow students to investigate broader areas in which they may apply their newly acquired skills. The module is designed for students who wish to specialize in the security aspect of the Computer Science field.

Learning Outcomes: By the end of the course, the students will be able to:

- gain basic knowledge of information security, basic techniques to protect data in computer and communication environments against several different varieties of security issues, security properties of systems, analyzing computer systems, and developing strategies to bypass security controls;
- solve problems of cryptography, encrypt/decrypt messages, solve problems of network security, make decisions regarding the adoption and implementation of information security related technologies, policies and practices in complex and unpredictable situations

Code: CPS 1215

Course: Computing and Problem Solving (SDP 1)

Author: Sarsenova Zhibek Nurzhanovna, lecturer, Master of Technical Sciences

Credits: 3

Hours: 135

Semester: 1

Prerequisites: none

Postrequisites: Application Development (SDP2)

Course Description: Computers play a critical role in just about everything humans do, and software professionals need a deep appreciation for the human and business aspects, as well as the theoretical. This subtle introduction to computing and problem solving provides students with realistic insights about the field of computing.

At the heart of computing is a way of thinking and working that is more disciplined than many students have ever experienced, but the benefits of seeing, understanding and then developing those skills can be stunning. This course prepares and launches students down to educational paths in all of the science and business domains, as well as in careers as software developers, software engineers, and computer scientists.

Computation and Problem Solving is a 15-week course in which students will learn problem-solving approaches and tools, professional communications, and professional behavior. Students will learn the world of professional deliverables, processes and behavior by joining the fictional company iCarnegie Consulting (iC) as a junior intern. In relation to this, students will solve problems using tools such as HTML, Cascading Style Sheets (CSS), JavaScript, and JQuery.

Learning Outcomes: By the end of the course, the students will be able to:

- organize, browse, edit and manage a variety of file types;
- develop, validate and debug simple interactive websites using HTML, CSS and JavaScript;

- describe basic software-development tools, processes, and concepts such as debugging, data representation, source code, executable code, verifiers, and APIs;
- deliver short, easy presentations and documents that are well considered, compelling and supported by evidence;
- search and evaluate information;
- present findings in an organized and compelling manner;
- discuss the notion that every problem has multiple solutions, each with its own advantages and disadvantages, and that success is tied to finding the technical solution that best fits into the non-technical dimensions of a specific problem.

Code: AD 1216

Course: Application Development (SDP 2)

Author: Sarsenova Zhibek Nurzhanovna, lecturer, Master of Technical Sciences

Credits: 3

Hours: 135

Semester: 2

Prerequisites: Computation and Problem Solving (SDP1)

Postrequisites: Application Design Choices (SDP3)

Описание: The “Application Development” course provides a high-level overview and builds concepts by elaborating and extending the students’ basic computational thinking and problem solving skills. It assumes you have used a computer, but possess little or no programming experience. Successfully completing this course will prepare students to use the basic vocabulary of computing and create small standalone programs.

Learning Outcomes: By the end of the course, the students will be able to:

- implement small programs to solve simple, well-defined problems;
- learn how to use objects as a key strategy to control complexity and support reuse;
- create simple programs using simple assignment statements and console terminal input and output;
- write short programs (less than 300 lines of code) that use:
 - control structures, basic functions, and primitive data types.
 - basic UML documentation, including activity diagrams, class diagrams, state diagrams.
 - object-oriented design concepts.
 - classes, data encapsulation and information hiding.
- use a development environment to create and debug simple applications.
- identify choices that has to be made to solve a problem, and weigh the pros and cons of a given solution;
- create applications from scratch that:
 - Properly use arrays to solve searching, sorting, and other similar simple problems.
 - Perform simple iteration.

Given a detailed design:

- create applications that solve more complex problems related to searching and sorting;
- perform more sophisticated iteration;
- implement a solution that uses all standard Java control-of-flow statements;
- explain the key ideas behind sorting and search algorithms, and implement at least one algorithm of each type;
- perform basic I/O operations to the console in textual form, as well as reading and writing text files.

Code: ADC 2217

Course: Application Design Choices (SDP 3)

Author: Senior – lecturer Mukashev S.

Credits: 3

Hours: 135

Semester: 3

Prerequisites: Application Development (SDP2)

Postrequisites: Performance, Data Structures and Algorithms (SDP4)

Course Description: Application Design Choices is the third course in the Software Development Program. The course is designed to extend the perception of students of industrial software development by understanding that basic design choices that exist and that there are consequences to these choices.

Learning Outcomes: By the end of the course, the students will be able to:

- devise moderate-sized applications using Object-Oriented principles derived from informal specifications and designs;
- produce moderate to large standalone Object-Oriented applications from correct UML specifications;
- create graphical User Interface applications using the standard Swing components and simple animations;
- produce well-structured implementations appropriate for team development, maintenance and reuse with careful attention to external and internal documentation.

Code: PDSS 2218

Course: Performance, Data Structures and Algorithms (SDP 4)

Author: Orazbekov Sayatbek Kairbekovich, senior-lecturer

Credits: 3

Hours: 135

Semester: 4

Prerequisites: Application Design Choices (SDP03)

Postrequisites: Algorithms of Artificial Intelligence

Course Description: This course addresses principles of good algorithm design, algorithms analysis, and foundational data structures. The emphasis is on selecting appropriate data structures and designing efficient and correct algorithms in execution of these data structures.

Students will learn about fundamental computing algorithms and analysis, including searching, sorting, recursion, trees, linked lists, stacks, queues, sets, maps, and graphs. Important elements in the course include measuring program performance and efficiency while comparing and contrasting results of small programs written in an object-oriented programming language (Java), with that of a procedural programming language (C). At the same time, an overview of the C programming language using a basic Unix environment is provided.

Learning Outcomes: By the end of the course, the students will be able to:

- list data structures and operators in JAVA;
- identify the types of variables for solving the practical tasks;
- solve practical tasks by creating programs on JAVA;
- compare and contrast the different ways of solving a problem after testing the program;
- modify and rewrite the created program using the analysis;
- explain the constituted program documentation.

Code: AD 2219

Course: Architecture and Design (SDP5)

Author: Aiman Nickolayevna Moldagulova, PhD

Credits: 3

Hours: 135

Semester: 4

Prerequisites: Performance, Data Structures & Algorithms (SDP4)

Postrequisites: Database and Client/Server Applications (SDP6)

Course Description: This course focuses on the study of large systems and how they were partitioned into subsystems and components, as well as how the structuring of these elements into a solution and the interfaces used to join them together facilitates communication and control. Students will explore with various notations and formalisms as they learn the relationship between these structures and key quality attributes and their impact on system implementation.

Learning outcomes: By the end of the course, the students will be able to:

- identify the importance of taking a risk-based approach to software development;
- Why doing so aids an organization in determining how much architecture is enough for a given project;
- identify risks and discuss how to mitigate them;
- explain how software architecture can be used to ensure quality goals will be met;
- discuss the purpose for creating different views of software architecture and be able to contribute to discussions in determining which are appropriate for a given project;
- discuss architectural choices, the short-term and long-term consequences associated with each choice and the rationale for selecting one choice over the others

Code: DCSA 3220

Course: Database and Client/Server Applications (SDP6)

Author: Ryskhan Zhakanovna Satybaldiyeva assistant professor, candidate of technical science

Credits: 3

Hours: 135

Semester: 5

Prerequisites: Database in information systems, Application Design Choices

Postrequisites: Network Communication and Security (SDP09)

Course Description: Well-designed database systems are at the heart of the enabling and functionally rich, Web-based software applications that are revolutionizing businesses today. This course prepares students to build such systems, by providing them with the practice and experiences to master key concepts of database system design and implementation. This course builds upon the knowledge and skills developed in the “Computation and Problem Solving” course, the Java courses and the usability design from the “Human/ Computer Interaction and Communication” course.

Learning Outcomes: By the end of the course, the students will be able to:

- produce database designs that represent processes drawn from business and other real-world domains;
- create data models using entity-relationship (ER) diagrams;
- develop sound schema designs using normalization;
- design Web-based database applications using SQL and JSP/Servlets;
- use index structures of a DBMS to improve performance;
- use the transaction features of a DBMS to achieve fault recovery and concurrency control.

Code: HCI 3221

Course: Human/Computer Interaction and Communication (SDP 7)

Author: Syrymbaeva Asel, Senior-lecturer, a.syrymbaeva@iitu.kz

Credits: 3

Hours: 135

Semester: 5

Prerequisites: Computation and Problem Solving (SDP01)

Postrequisites: Project Management (SDP08)

Course Description: This course combines a component that teaches programming interactive user interfaces with one that teaches methods to improve the *usability* of those interfaces. The course proceeds from the view that interface usability is essential to successful software design and not merely a matter of "packaging" or aesthetics. Interface usability in fact can have a critical impact on an application's overall quality and effectiveness: an accurate, fast, and powerful application can be rendered useless by a poorly-designed user interface when the people who might otherwise benefit from the application find the interface frustrating, difficult, or impossible to use. The course is organized into four units. Each unit consists of a series of topics and includes multiple-choice quizzes, practical quizzes, and a few extended exercises, all of which will help students gain a solid understanding of the material. In addition, the course features three in-class exams.

Learning Outcomes: By the end of the course, the students will be able to:

- gain skills and enough experience in working in group projects by solving real projects.

Code: PM 3222

Course: Project Management (SDP8)

Author: Bayekeyeva Assel, senior-lecturer, MSc in Computer Information Systems

Credits: 3

Hours: 135

Semester: 6

Prerequisites: Computation and Problem Solving (SDP01)

Postrequisites: Managing Technical People (SDP11)

Course Description: This course provides students with a comprehensive overview of the principles, processes, and practices of software project management. Students learn techniques for planning, organizing, scheduling, and controlling software projects. Students will obtain practical project management skills and competencies related to the definition of a software project, establishment of project communications, managing project changes and managing distributed software teams and projects. Project Management Body of Knowledge (PMBOK) as a framework for this course focused on. This is now a world-wide defacto standard for project management and recommended by IEEE and ANSI as well for their project management standard

Learning outcomes: By the end of the course, the students will be able to:

- define the difference between a program, project, portfolio, and operation; and the key processes that all projects might go through
- identify the project management knowledge areas and process groups
- classify project planning, organization and control, both theory and practice
- apply techniques such as, work breakdown structure, network diagrams, critical path analysis, and critical chain scheduling
- develop a comprehensive software project management repository for the a real-world Web based project via a Web Project implemented in small working teams in a collaborative manner
- develop an appreciation of the many skills required to do good systems analysis and design using skills developed in this and other computer science courses and previous work experience

Code: NS 3223

Course: Networking and Security (SDP9)

Author: Kozhamzharova Dinara Khanatovna, MSc

Credits: 3

Hours: 135

Semester: 7

Prerequisites: Performance, Data Structures and Algorithms (SDP4)

Postrequisites: Managing Technical People (SDP11)

Course Description: This course provides students with a working vocabulary, as well as the knowledge and skills required to implement, debug and enhance basic networked applications, with insights about the kinds of defects that can be exploited to the system's detriment; how these attacks are carried out; and how they can be prevented, detected and stopped.

The course explores networked communication from local area networks (LAN) up to the global Internet. The standard problems and a range of solutions for each are explored, with a special focus on the TCP/IP protocol suite. Also, it will prepare students for real-life information security operations. A background on networking fundamentals will refresh students with a concentration on challenges faced in today's infrastructure.

Learning outcomes: By the end of the course, the students will be able to:

- produce simple client-server and peer-to-peer applications;
- use standard protocols to address various communications issues;
- demonstrate how socket programming is done with UDP and TCP;
- develop proper software configurations to establish a secure and functioning networked application;
- use standard hardware and software tools to manage a network for a distributed application;
- apply performance analysis tools to assess network performance;
- employ standard networking diagnostic tools to debug standard network problems.
- implement basic SSL security.

Code: MTP 4224

Course: Managing Technical People (SDP11)

Author: Gabidenkyzy Zh., senior-lecturer

Credits: 3

Hours: 135

Semester: 7

Prerequisites: Project Management (SDP08)

Postrequisites: none

Course Description: The course will examine various levels of complexities in human interaction and deal with issues of leadership and teamwork; cultures and ethics; communications and negotiations; decision making; and conflict management, all with a goal of managing people effectively through the software-development and employee life cycles.

Learning outcomes: By the end of the course, the students will be able to:

- Recognize the various influencing factors that relate to human interactions and use them successfully.
- Interact with various personality, behavioral and communication styles, comparing and contrasting the differences that exist and applying techniques for dealing with each of them.
- Practice various negotiations and conflict management techniques in employee, peer and management level interactions.
- Analyze human interactions to uncover best practices and learn to effectively deal with problems and workplace challenges.
- Discover your own styles of communication, decision making, negotiation, leadership and conflict management and employ this knowledge in professional scenarios.

Code: LACS 2225

Course: Legal Aspects of Computer Science

Author: Maulenov Kasym Syrbaevich, Professor, Doctor of law

Credits: 2

Hours: 90

Semester: 3

Prerequisites: none

Postrequisites: Business law

Course Description: This course introduces students to the methodology of reading legal texts: extending from articles to treaties, constitutions, legislation and cases. It also provides an overview of the structure and hierarchical form of most domestic legal systems and their relation to international law and organizations. The course covers the basic techniques of legal research, writing and analysis. Students learn to brief cases, perhaps synthesize cases from related fields, and write legal documents.

Learning outcomes: By the end of the course, the students will be able to:

- to define a broader and deeper knowledge of the principles and sources of international and Kazakhstan intellectual property law as well as knowledge of how these have changed and are changing as a result of globalization
- to identify a knowledge of intellectual property law methodology, an improved ability to argue, analyze and evaluate complicated legal issues from an intellectual property rights perspective
- to describe intellectual property law issues in a qualified manner
- to construct the skills to write an academic thesis on international or Kazakhstan intellectual property law issues satisfying the requirements of objectivity, structure, analytical reasoning and independence.

Major courses:

Code: FIS 1301

Course: Fundamentals of Information Systems

Author: Serbin V.V., Head of IS department, candidate of technical sciences

Credits: 3

Hours: 135

Semester: 2

Prerequisites: Algorithms, data structures and programming

Postrequisites: Databases in IS

Course Description: This course is about the complete life cycle of the information system's development process, starting with the description of the idea, establishing software requirement specifications, modeling, developing, testing, debugging software, calculating the feasibility study cost of the information system development, ending with the presentation for the customer. The course also covers the theoretical and practical issues of the construction and operation of IS, namely the classification of IS, UML modeling, ADO technology, criteria for evaluation of IT projects, etc.

Learning Outcomes: By the end of this course, the students will be able to:

- determine consequence and maintenance of stages of IS design;
- identify modern methodologies of IS design;
- use instrumental tools of IS design;
- identify perspectives of information systems development, their connection to related areas;
- formulate and solve tasks of information systems design with the use of technology, based on functional specifications;
- formulate main scientific-technological problems on automation and IS objects exploration;
- apply methods of subject area analysis and applied information systems creation.

Code: BDIS 2302

Course: Database in Information Systems

Author: Karlygash Mukhitova Yerdauletkyzy, senior-lecturer, MSc in Cyber Security

Credits: 3

Hours: 135

Semester: 4

Prerequisites: Fundamentals of Information Systems

Postrequisites: Oracle SQL Basics

Course Description: This course introduces students to database systems and explains what a database system is. It then proceeds for the greater part of the learning material to explore relational database systems—databases designed according to the relational (or tabular) model. From data abstraction, the course then turns to transaction management, with some additional material on improving query performance. Finally, there is an introduction of up-to-date trends in database system design, which also locates recent developments in the larger history of data storage technology.

Learning Outcomes: By the end of the course, the students will be able to:

- create diagrams and data models for projects;
- design and develop normalization for tables;
- solve practical tasks on SQL;
- compare and contrast the different ways of solving problems;
- modify and rewrite the created program using the analysis;
- explain the constituted program documentation.

Elective Courses

Code: ADM 3303

Course: Application development on MS .NET Framework platform (MS prog 1)

Author: Filko I., senior-lecturer

Credits: 3

Hours: 135

Semester: 5

Prerequisites: Object-Oriented Programming

Postrequisites: MS Programming 2 (MS.NET Framework 3.5–ASP.NET Forms Application Development)

Course Description: The major goal of the course is to develop console or windows .NET applications using C# programming language using object-oriented programming concepts. Topics of the course include the .NET paradigm, C# programming, FCL, CLR, file processing, serialization, exceptions, structures, collections, object-oriented programming concepts, drawing, threading, application domain and services, configuring applications.

All laboratory and home works will be performed on Microsoft Visual Studio 2010 or newer.

Learning Outcomes: By the end of the course, the students will be able to:

- create console/windows applications in the Visual Studio.NET;
- create and use classes and objects in C# application;
- use the encapsulation, inheritance and polymorphism concepts in console/windows applications;
- process error exceptions;
- create graphics and threads;
- to explain the constituted program documentation.

Code: DWC 3303

Course: Development of Web components on the Java EE platform (Java 1)

Author: Mukatayev T., senior-lecturer

Credits: 3

Hours: 135

Semester: 5

Prerequisites: Application Design Choices

Postrequisites: Development of the business components on the Java EE Platform (Java 2)

Course Description: This course prepares students for the OCPJWCD certification (Oracle Certified Professional Level Professional), which provides basic knowledge of the development of Java components (servlets and JSPs) used in web applications.

Learning outcomes: By the end of the course, the students will be able to:

- identify the main ideas of Java-components;
- development of Java-components;
- implement servlets;
- implement JSP-Pages;
- understand web applications using servlets and JSP-pages.

Code: OSB 3303

Course: Oracle SQL Basics (Oracle 1)

Author: Karlygash Mukhitova Yerdauletkyzy, senior-lecturer

Credits: 3

Hours: 135

Semester: 5

Prerequisites: Database in Information Systems

Prerequisites: Programming with PL / SQL (Oracle2)

Course Description: The course provides the students with the complete skills needed to create, implement and manage robust database applications using the Oracle database tools. Most of the topics covered are – understanding of the Basic Procedural Language/Structured Query Language, subprogram, section and syntax query, DML, advanced DML and scripting. Starting with the basic outline of what PL/SQL is, students will set the ground work for their knowledge expansion by learning about data types, flow control, errors, and more. You will explore strings, numbers, booleans, and arrays.

Learning Outcomes: By the end of the course, the students will be able to:

- design, build and manage database applications in Oracle 11g;
- write PL/SQL codes for developing stored procedures, triggers and packages;
- manage and create database sequence, synonym and tables;
- improve data security, performance and integrity;
- use SQL developer for manipulation and retrieval of data efficiently;
- work with various PL/SQL sections like Declaration, Execution, and Exception Handling

Code: DMA 3303

Course: Development of mobile applications for IOS (mobile 1)

Author:

Credits: 3

Hours: 135

Semester: 5

Prerequisites: Algorithms, data structures and programming

Postrequisites: Development of mobile applications for Android (Mobile 2)

Course Description:

The course explores the basics of the basics of Mac OS X, its capabilities, and basic settings. Acquainted with the interface Mac OS X Mountain Lion. Dock - with him begins work on Mac OS X. Starting and closing programs. Settings Dock. Stacks in the Dock.

Sorting and convenient representation of files. Top panel programs in Mac OS X. How to understand what you are currently working. Standards menu. Modifier keys, keyboard shortcuts and their designations. Opportunity to accelerate its work in Mac OS X. Windows programs. What is Mission Control, how to handle a multi-system. Gestures on the touchpad and active corners.

Learning outcomes: By the end of the course, the students will be able to:

- devise moderate-sized applications using Object-Oriented principles derived from informal specifications and designs.
- produce moderate to large standalone Object-Oriented applications from correct UML specifications.
- create graphical User Interface applications using the standard Swing components and simple animations.
- produce well-structured implementations appropriate for team development, maintenance and reuse with careful attention to external and internal documentation.
- successfully create JavaDoc documentation complete with pre and post conditions
- develop internal documentation that justifies assertion of correctness by means of useful loop invariants and other basic proof of correctness tools.
- use UML-based designs to write moderate to large applications and basic design patterns.

Code: ISE 3303

Course: Introduction to SAP ERP (SAP 1)

Credits: 3

Hours: 135

Semester: 5

Prerequisites: Fundamentals of information system

Postrequisites: Integration of business processes (SAP 2)

Course Description: A brief history of ERP. What is ERP-systema. Rol ERP-system. The concept of resource planning systems across the enterprise. The concept of next generation ERP-II. What can you do ERP-system. Functions of the ERP-system. The main purpose of the ERP-system. Scope of application. Characteristics of ERP-systems. Selection of ERP-system. Architecture ERP. Classification of ERP-systems. Market Analysis of ERP-systems. Introduction. New trends: rent ERP-systems. Overview of SAP R / 3.

Learning outcomes: By the end of the course, the students will be able to:

- work with a client program;
- customize the GUI;
- navigate the system;
- perform simple operations.

Code: IR 3303

Course: Introduction to Robotics (Robotics 1)

Author: Md. Mahmud Hasan, Professor, Ph.D

Credits: 3

Hours: 135

Semester: 5

Prerequisites: Physics

Postrequisites: Robotics (Robotics 2).

Course Description: The subject of the study are the principles and methods of development, design and programming of the control electronics based computing platform (controller) Arduino or her clone. The purpose of teaching the course "Robotics" are : to improve knowledge in the field of robotics; to acquaint students with the principles and methods of design, construction and programming of the control electronics based computing platform Arduino programming skills to develop in a modern programming environment; deepen their knowledge, increase motivation to learn through practical application of integrated knowledge gained in various educational areas (mathematics, physics, computer science); develop an interest in scientific and technical, engineering and design creativity.

Learning outcomes: By the end of the course, the students will be able to:

- Understand the concept of degree of uncertainty in well-structured environments such assembly lines environments. Student will interact with the environments with the actuators and sensors.
- Utilize various types of sensors with the Arduino controller. In addition, multiple sensor fusion will be in the practice.
- Apply the mathematics and controlling part of the robotics in practice.
- Construct the modeling of the overall Environment, sensor and robotics
- Understand the real-time control and task handling using mathematical model.

Code: DAA 3304

Course: Developing ASP .NET applications (MS prog 2)

Author: Altaibek A., ass.-proff., PhD

Credits: 3

Hours: 135

Semester: 6

Prerequisites: Developing applications on the platform MS .NET Framework (MS prog 1)

Postrequisites: Developing ADO.NET applications (MS prog 3)

Course Description: This course is directed to study of ASP.NET technology for developing web applications. Topics of the course include the base principles of ASP.NET for creating web projects, web forms architecture, ASP.NET controls, Validation and user controls, data access in ASP.NET, MVC in ASP.NET, configuration and deploying the ASP.NET web applications. All laboratory and home works will be performed on Microsoft Visual Studio 2010 or newer.

Learning outcomes: By the end of the course, the students will be able to:

- develop ASP.NET web applications using C# language;
- work with ASP.NET server, validation and user controls;
- configure and deploy web application using the ASP.NET and ADO.NET technologies;
- manage web site security and access permission.

Code: DBC 3304

Course: Development of the business components on the Java EE Platform (Java 2)

Author: Mukatayev T., senior-lecturer

Credits: 3

Hours: 135

Semester: 6

Prerequisites: Development of Web components on the Java EE platform (Java 1)

Postrequisites: Development of web- services in the Java EE Platform (Java 3)

Course Description: This course prepares students for OCPJBCD certification (Oracle Certified Professional Level: Business Component Developer for Java EE 5 platform), which assumes knowledge of the basics of developing Java components for distributed enterprise applications. Particular attention is paid to the development of EJB components.

Learning Outcomes: By the end of the course, the students will be able to have a basic understanding of the following;

- practice EJB and MDB API
- deploy and manage Application Server (Glassfish)
- use EJB containers, Hibernate, JPA and JavaMail API
- identify Object-relational-mapping (ORM)
- practice JAVA Persistence API (JPA)

Code: PPS 3304

Course: Programming with PL / SQL (Oracle 2)

Author: Imasheva Baktagul Kalamzhankyzy, senior-lecturer

Credits: 3

Hours: 135

Semester: 6

Prerequisites: Oracle SQL Basics (Oracle 1)

Postrequisites: Development web applications based on the Oracle (Oracle 3)

Course Description: This Oracle Database: Program with PL/SQL training starts with an introduction to PL/SQL and then explores the benefits of this powerful programming language. Students will learn to develop stored procedures, functions, packages and more.

Learning Outcomes: By the end of the course, the students will be able to:

- design, build and manage database applications in Oracle 11g;
- write PL/SQL codes for developing stored procedures, triggers and packages;
- manage and create database sequence, synonym and tables;
- improve data security, performance and integrity;
- work with various PL/SQL sections like Declaration, Execution, and Exception Handling;
- create and debug stored procedures and functions;
- optimize the performance of the system.

Code: DMA 3304

Course: Development of mobile applications for Android (Mobile 2)

Author: Karimzhan NB, Senior Lecturer, Master IS

Credits: 3

Hours: 135

Semester: 6

Prerequisites: SDP-1, SDP-2, SDP-3

Postrequisites: SDP-5, SDP-6

Course Description: The course is an introduction to programming mobile applications using the latest the Android. Topics include the activity lifecycle, resources, layouts, intents for multiple activities, menus, fragments and dialogs, Action bar, adapters, data persistence via shared preferences, SQLite, and content providers. Emphasis is on hands-on use of these components in applications. Includes a substantial team project.

Learning Outcomes: By the end of the course, the students will be able to:

- demonstrate the basic concepts and technique of developing applications for the Android phone.
- practice the SDK and other development tools.
- demonstrate the basic concepts of Android phone features and capabilities.
- demonstrate how to acquire additional resources and security information needed for various different types of Android applications features and services (maps, SMS, Email, etc).
- demonstrate how to work with the SQLite database features.

Code: IBP 3304

Course: Integration of business processes (ERP 2)

Credits: 3

Hours: 135

Semester: 6

Prerequisites: Introduction to SAP ERP (SAP 1).

Postrequisites: Production planning (SAP 3).

Course Description: The course covers the theory and practice of ERP. The course contents include the evolution of ERP systems, business process reengineering, charting, in the ERP lifecycle functionality ERP and accounting and risk issues. There is also a significant component of this Class technology. IITU is a member of the University Alliance SAP, and you as a student have the opportunity to study SAP, is the market leader in ERP software. The knowledge obtained in this course will give you a competitive advantage in the market, as SAP is used by thousands of companies worldwide and practical training are highly valued recruiters. As well, it is the only ERP course in the country, for the students, where there are as many as four courses in SAP and the opportunity to obtain a certificate from TERP10 SAP.

Learning outcomes: By the end of the course, the students will be able to:

- identify the types of items.
- solve problem of calculation salary of workers.
- work in SAP ERP GUI
- explain work as SAP user in role of accountant
- compare and contrast the different ways of creating item profiles in SAP ERP

Code: Rob 3304

Course: Robotics (Robotics 2)
Author: Md. Mahmud Hasan, Professor, Ph.D
Credits: 3
Hours: 135
Semester: 6
Prerequisites: Introduction robotics (Robotics 1)
Postrequisites: Robotics 3

Course Description: Robotics-2 course will provide a platform to program the single board computer with various sensor and robot. This will focus over the comprehensive coverage of the robotic science and technology from design to application. The course will provide the opportunities for hands-on practical experience with the Raspberry-pi and various sensors with robotics manipulator. Finally, this course will develop the essential skills to control and modeling and application aspects in the various real world applications.

Learning Outcomes: By the end of the course, the students will be able to:

- understand the single board computer, mechanical engineering and mathematics.
- utilize the popular Raspberry-pi device programing.
- construct the programs applying Python programing language.
- define the methods of computer-science materials.
- combine the Raspberry PI B+ and Arduino.

Code: DAA 4305

Course: Developing ADO.NET applications (MS Prog3)
Author: Altaibek Aizhan, assistant professor, PhD in Computer Science
Credits: 3
Hours: 135
Semester: 7

Prerequisites: Microsoft .NET Framework 3.5, The development of applications based on ASP.NET (MS Programming 2)

Postrequisites: Diploma Project

Course Description: This course is directed to study of objects and classes of the ADO.NET technology for working with different data source through .NET applications. Topics of the course include the ADO.NET providers and objects, Entity Framework of ADO.NET, LINQ to DataSet/Entity/SQL , WCF Data Services.

All laboratory and home works will be performed on Microsoft Visual Studio 2010 or newer

Learning Outcomes: By the end of the course, the students will be able to:

- apply objects and services of ADO.NET for connecting, retrieving, creating, designing, updating, binding, querying and storing databases;
- access the right data values and bring related data together in ADO.NET;
- establish external connections to Databases via SQL Server, OLE DB and ODBC connections string;
- present data in windows forms, wpf and asp.net applications;
- manage entity data through objects in ADO.NET;

Code: DWS 4305

Course: Development of web- services in the Java EE Platform (Java 3)
Author: Mukatayev T., senior-lecturer
Credits: 3
Hours: 135
Semester: 7
Prerequisites: Development of the business components on the Java EE Platform (Java 2)

Postrequisites: Diploma Project

Course Description: This course prepares students for the OCPJWSD certification (OCPJWSD: Oracle Certified Professional Level: Web services developer for the Java EE 5 platform), which involves the ability to develop Web services using Java technologies such as Java Web Services Developer Pack, JAX-WS And JAXB. In addition, this course covers XML, JSON, REST, and the basics of security.

Learning Outcomes: By the end of the course, the students will be able to:

- practice JAX-RS and JAX-WS
- demonstrate REST web services
- examine SOAP web service
- sparse JSON and XML
- integrate with Amazon SES, Google Maps

Code: DWA 4305

Course: Development of web applications based on the Oracle (Oracle 3)

Author: Imasheva Baktagul Kalamzhankyzy, senior-lecturer

Credits: 3

Hours: 135

Semester: 7

Prerequisites: Programming on PL/SQL (Oracle 2).

Postrequisites: Diploma Project

Course Description: Using a database in Data Guard standby mode to perform functions such as building reports, queries, testing and implementation of backup. Create and manage physical and logical database in standby mode. Using Enterprise Manager Grid Control and Command Line Interface Data Guard (DGMGRL) to accompany the Data Guard configuration. Using the Data Guard for high availability databases Oracle.

Learning outcomes: By the end of the course, the students will be able to:

- use database in Data Guard mode;
- perform several functions;
- build reports, queries;
- test and implement backups;
- create, control database (physical and logical).

Code: CPA 4305

Course: Cross-platform Applications Development (Mobile 3)

Credits: 3

Hours: 135

Semester: 6

Prerequisites: Development of mobile applications for IOS » (Mobile1)

Postrequisites: Diploma Project

Course Description: Mobile application development is a process in application development for small portable devices such as PDAs, smart phones or cell phones. These applications can be pre-installed on the device during the manufacturing process and might be loaded through various platforms to spread or it might be a Web application that is processed on the client side (JavaScript) and server side.

Learning outcomes: By the end of the course, the students will be able to:

- familiarize themselves with available tools to develop their own applications;
- create graphical user Interface applications using the standard components and simple animations;
- produce well-structured implementations appropriate for team development, maintenance

- and reuse with careful attention to external and internal documentation;
- create architecture for mobile applications;
- develop mob applications;
- implement several functions for apps.

Code: PP 4305

Course: Production Planning (ERP 3)

Credits: 3

Hours: 135

Semester: 7

Prerequisites: Integration of business processes (ERP 2).

Postrequisites: Diploma Project

Course Description: The AFS system can transfer the data to the lower level of the material. The materials are characterized by these data in accordance with certain characteristic values such as size, color and quality, which affect the entire logistics process.

For example, using the categories can be defined as the differences between the different materials. Characteristic values of materials for production are already contained in the BOMs and routings.

Data obtained from the forecast of consolidated or Sales and Operations Planning in the standard SAP-system, can be transferred to the AFS system and use them for production planning, taking into account specific features of the materials AFS. These data are used in MRP to meet the needs, such as customer orders, at the expense of existing stocks / inventory plan.

Learning outcomes: By the end of the course, the students will be able to:

- Modern, evolutionary-style work breakdown structures (WBS).
- Effort allocations and schedule estimates using COCOMO.
- Planning and management artifacts for controlling projects.
- Important management principles in the context of software project management.
- Existing artifacts to understand a project and its context and to make critical management decisions.
- Project control and process instrumentation metrics.
- Workflow models.
- Standards for documentation, risk assessment, and quality assurance.

Code: Rob 4305

Course: Robotics (Robotics 3)

Author: Md. Mahmud Hasan, Professor, Ph.D

Credits: 3

Hours: 135

Semester: 7

Prerequisites: Robotics 2

Postrequisites: Diploma Project

Course Description: The difference between sensor-controlled behavior and what computers usually do is that the input from a sensor is ambiguous. Design sensor solutions for industrial companies that allow for complete digitalization of manual measurements and comprehensive sensor data tracking and analytics. The combination of intelligent sensors and analytical capability allows continuous monitoring of measurement data, but can also be configured to trigger automatic process adjustments in real time. The result is reduced down times and increased precision and reliability. This course will deliver the concepts and ideas towards smart factories. This course will highlight the process of sensor technology and AI as an supporting algorithms for the: assembly, biosensors, robotics, computer vision and sensor networks.

Learning Outcomes: By the end of the course, the students will be able to:

- explore the AI techniques.
- provide clear mathematical knowledge over the Neural Networks and cognitive based learning.
- understand the Fuzzy logics of rule based learning.
- develop applications of AI.
- define the potential applications of machine learning in practice.

Code: DM 3306

Course: Data Mining (DM 1)

Author: Alibek Maratuly Mamyrbekov, Master of Technical Sciences

Credits: 3

Hours: 135

Semester: 6

Prerequisites: College Algebra

Postrequisites: Data Management

Course Description: This course emphasizes deep thinking about data analysis concepts underlying the C# language. During the course, we will be on statistical principles that will allow us to see statistics in a new light. As we explore simulation-based analysis methods, in particular the bootstrap method, we will come to a fuller understanding of statistical inference. We will also gain access to very general principles that allow us to produce statistical inference for most data analysis situations you may encounter in the future.

Learning Outcomes: By the end of the course, the students will be able to:

- define the main tendencies in the field of data mining and analysis using information technologies;
- identify information resources for search and information storage;
- practice with electronic spreadsheets, to execute consolidation of data, to visualize results of work with databases;
- apply methods and means of information searching and presentation;
- design and create simple applications.

Code: DM 4307

Course: Data Management (DM 2)

Author: Alibek Maratuly Mamyrbekov, Master of Technical Sciences

Credits: 3

Hours: 135

Semester: 7

Prerequisites: Data Mining

Postrequisites: none

Course Description This course emphasizes deep thinking about data analysis concepts underlying the C# language. We will ask: How does the data analysis work? What are its objects? What is the effect of executing data analysis and mining functions? To this end you will need to understand some seemingly arcane aspects of any computer language. This class builds up slowly but steadily. In the second half of the semester you will start seeing some surprising powers of computation.

Another emphasis, later in the course, will be on statistical principles that will allow us to see statistics in a new light. As we explore simulation-based analysis methods, in particular the bootstrap method, we will come to a fuller understanding of statistical inference. We will also gain access to very general principles that allow us to produce statistical inference for most data

analysis situations you may encounter in the future.

Learning Outcomes: By the end of the course, the students will be able to:

- Define the data in computer systems;
- Understand the concept of spreadsheets and data visualization techniques;
- Define the concept of database architecture, the SQL language basics, directions of development of the database;
- Apply the practical knowledge in mathematical models used in data analysis and Basis of programming language C#;
- Practice the graphical Instruments, the presentation of information processing, the concept of business process;
- Define the main tendencies in the field of data mining and analysis using information technologies; use information resources for search and information storage;
- Execute consolidation of data, to visualize results of work with databases; apply methods and means of information searching and presentation; to design and create simple applications.

Code: WT 2310

Course: WEB technology

Author: Pachshenko Galina Nikolaevna, Associate Professor, candidate of technical science

Credits: 3

Hours: 135

Semester: 4

Prerequisites: Object-Oriented Programming

Postrequisites: Internet Entrepreneurship

Course Description: The course WebTechnologies introduces advanced web design techniques. It caters fundamental Internet and web technologies that a student needed to determine with significant attention to HTML, CSS, PHP, JavaScript and other web technologies to programming with them. Topics include customer expectations, advanced markup language, multimedia technologies, usability and accessibility practices, and techniques for the evaluation of web design.

Learning Outcomes: By the end of the course, the students will be able to:

- list web technologies;
- identify different web technologies;
- solve practical tasks by creating high impact and highly functional websites;
- compare and contrast the different ways of solving a problem for created websites;
- modify and rewrite created codes using the analysis. To explain created code documentation.

Code: BSR 3312

Course: Basis of Scientific Research

Author: V.Serbin, Sinchev B.K., b.sinchev@iitu.kz

Credits: 1

Hours: 45 hours

Semester: 6

Prerequisites: Information and Communication Technologies

Postrequisites: Diploma Project

Course Description: (Scope, approach to learning, the main types and methods of training activities). The course aims at developing the capacity for independent undergraduate theoretical and practical judgments and conclusions, skills objective assessment of scientific information, freedom of scientific research and the pursuit of the application of scientific knowledge in the educational activity. Research work bachelor includes research work in a semester (NIRB)

research practice (NIPB); science teaching practice (NPFS), preparing for the final state certification (IGAB), including the protection of final qualifying work (cs cpfe vts).

Learning outcomes: By the end of the course, the students will be able to:

- master the means and methods of performing research;
- determine methods and procedures for working with diverse array of scientific information, scientific literature, current standards and rules for the preparation of scientific manuscripts for publication;
- develop literacy skills to present the results of their research and the ability to convincingly defend and justify the results.

Code: CCED 3308

Course: Programming with Python

Author: Myrzakerimova (Ospan) Alua Bauyrzhankyzy, lecturer, MSc in Information Technology

Credits: 3

Hours: 135

Semester: 5,6

Prerequisites: Basics of Information Systems

Postrequisites: Object oriented programming, Project Management

Course Description: This course aims to teach one of the rapidly growing and popular Python programming languages. The basis covers such important concepts as object-oriented programming, functional programming, event-driven program (GUI-applications). Python is freely available for many platforms (such as Unix, Windows, Linux, RiscOS, MAC, Sun), and programs written on it is usually portable across platforms without any changes. This makes it possible to apply for the study of language, any available hardware platform.

Learning Outcomes: By the end of the course, the students will be able to:

- develop algorithms and models for applications in the Python programming language;
- develop informational, functional and software in the Python programming language; programming in an integrated environment object-oriented Python programming;
- apply the knowledge from the course for the development of its educational program inc computer science;
- use the programming skills that allow you to create applications that can improve current activities and enable the emergence of new ideas.

Code: CCED 3308

Course: Game development

Author: Assistant professor, PhD Rakhmetulayeva S.B.

Credits: 3

Hours: 135

Semester: 5,6

Prerequisites: Алгоритмы и Структуры данных

Postrequisites: Diploma project

Course Description: This course introduces basic techniques used to design and implement computer games and/or simulation environments. Topics include a historic overview of computer games and simulators, development of a game with collaboration from the class, creation of team game documents, description and use of a game engine, practical modeling of objects and terrain, and use of audio. Physics and artificial intelligence in games are covered briefly. Programming is based on the Blueprint scripting language of Unreal Engine The course topics will be assimilated through the design of a 3D game designed and implemented by each student team.

Learning outcomes: By the end of the course, the students will be able to:

- describe the history and evolution of video and computer games and game genres;
- develop Action Games;
- demonstrate Level Design in Game Programming;
- use C++ and GML to Code Game Programs.

Code: CCED 3308

Course: Cybersecurity

Credits: 3

Hours: 135

Semester: 5, 6

Prerequisites: Operation Systems, Web Technologies, C Programming Language.

Postrequisites: none

Course Description: This course is designed for students who are interested in the study of popular methods and mechanisms for the protection and hacking information. The course offers a lot of different practical tasks to strengthen the material studied. This course will also examine the latest encryption methods (cryptography).

Learning outcomes: By the end of the course, the students will be able to:

- hack web-sites and programs;
- protection against attacks.
- analyze the security code;
- improve security posed by Web sites;
- write secure code.

Code: CCED 3308

Course: 1-C programming

Author: Filko I.N, Msc in Technical Sciences

Credits: 3

Hours: 135

Semester: 6

Prerequisites: none

Postrequisites: none

Course Description: The course "1-C: programming" presents basic "1C" concepts equipment principles. Explains the usage rules and the program interface. Teaches you how to create programs in the development environment. Prepares for the exam.

Learning outcomes: By the end of the course, the students will be able to:

- use the software "1c" version 8.3.
- develop simple programs for solving current tasks
- explore the basic operations of cache and main memory, I/O operations

Code: CCED 3308

Course: Introduction to Information Retrieval Systems

Author: Ryskhan Zhakanovna Satybaldiyeva assoc. professor, candidate of technical sciences

Credits: 3

Hours: 135

Semester: 2

Prerequisites: Databases in information systems; Performance, Data Structures and Algorithms (SDP 4)

Postrequisites: diploma project

Course Description: Recent years have seen a dramatic growth of natural language text data,

including web pages, news articles, scientific literature, emails, enterprise documents, and social media such as blog articles, forum posts, product reviews, and tweets. This course will cover search engine technologies, which play an important role in any data mining applications involving text data for two reasons. First, while the raw data may be large for any particular problem, it is often a relatively small subset of the data that are relevant, and a search engine is an essential tool for quickly discovering a small subset of relevant text data in a large text collection. Second, search engines are needed to help analysts interpret any patterns discovered in the data by allowing them to examine the relevant original text data to make sense of any discovered pattern. You will learn the basic concepts, principles, and the major techniques in text retrieval, which is the underlying science of search engines.

Learning outcomes: By the end of the course, the students will be able to:

- demonstrate basic theories of information retrieval and in particular the essence of search engines;
- define the tasks of information retrieval, web search and classification, and the differences between them;
- describe the main concepts, challenges and strategies used in IR, in particular the retrieval models currently used;
- define manner in which documents are preprocessed before indexing;
- identify techniques for compressing dictionaries and inverted indexes;
- describe the architecture and requirements of a basic web crawler;

also be able to demonstrate the following skills, generally assessed through programming assignments:

- process simple Boolean queries and queries that have spelling errors and other imprecise matches to the vocabulary;
- apply various indexing, matching, organizing, and evaluating methods to IR problems;

Code: CCED 3308

Course: Innovation Management

Author: Zhanerke Gabidenkyzy, MsC in Innovation Management

Credits: 3

Hours: 135

Semester: 6

Prerequisites: none

Postrequisites: none

Course Description: The course will examine the rewards (and challenges) of innovation. Think about how to understand innovation and thus better equip ourselves to survive and prosper in a world of 'creative destruction'. Also look at some case studies of innovation. Additionally, Consider various tools and approaches for innovation management.

Learning outcomes: By the end of the course, the students will be able to:

- assess the importance of innovation and its effective management
- explain some contemporary models of innovation and link these to current practice
- illustrate the practice of innovation management by reference to one or more case studies
- describe the innovation process and critique a variety of tools and approaches to manage this process
- identify the effects of institutions and national systems of innovation on the innovation management process
- evaluate a set of enabling mechanisms and structures to encourage innovative behavior
- identify best practice in managing innovation across multiple sectors, such as benchmarking