**Óbuda University Alba Regia Technical Faculty**

**Institute of Geoinformatics**

**Main features of the credit system, peculiarities of the branches**

In the Hungarian higher education **credits** are for measuring the fulfillment of the study requirements in the curriculums alongside with the marks. In 2000 the Government issued a decree (200/2000) about the obligatory introduction of the credit system in the higher education. This system uses the concepts and methods of the European Credit Transfer System at a large scale.

The essence of the system: obtaining the degree is subject to a certain amount of verified study work. For the fulfillment of the educational requirements the students get credit points. This is an index-number proportional to the study time. The whole study time for an average student is incorporated in the model curriculums of the institutions. This study time includes not only the lessons but also the time which is needed for the students for individual preparations ( in the examination session as well). According to the international agreements

30 study hours equal 1 credit point. The number of the credit points coming from the certain subjects, those which can be collected during the semesters (basically 30), the whole credit number necessary for the degree and for the qualification ( in the traditional college training 180, in the BSc basic training 180+30 is in the model curriculum as well.

Students can get credits if they account for their knowledge. Forms of examining: examinations, mid-term grades, reports. In the case of the examinations and the mid-term grades five grades are used, in the case of the reports there are three grades: well-done satisfactory, unsatisfactory. Credit points can be obtained only if the qualification is at least a two or a satisfactory.

The number of the credit points shows the progress in the training as well. The credits accumulate and only a certain number of them can lead forward.

Following the ECTS, there are three subject categories in our model curriculum: Obligatory subjects (A), Obligatory-optional subjects(B) and Electives (C).

Students get credit points for the time of their practice and for a successful dissertation as well.

The credit system relieves the restriction of the former educational systems creating the possibility of a more flexible training discipline with more choice.

Following the model curriculum the qualification can be obtained within an optimal time but at the same time it enables the students to organize their individual curriculum after the first few semesters with regard to how the subject are built on one-another. They do not have to repeat semesters any more. Subjects can be taken repeatedly – under certain circumstances - ensuring a continuous process.

The introduction of the new system promotes the acknowledgement of training in other institutes and the completion of part-time studies in other universities (even abroad).

# Study programmes:

**Land Surveying and Land management Specialization (BSc) Head of Specialization:** Dr. György Busics ([busics.gyorgy@amk.uni-obuda.hu](mailto:busics.gyorgy@amk.uni-obuda.hu))

**Consultant Committee:** Education Committee

**Educational goal:** Training of engineers for land management, within this for national survey and for map-making, who are able to do the basic land surveying jobs, familiar with the up-to- date equipment, the measuring and the adaptation procedures, take part in environment protection and hazard prevention projects and are willing to broaden their knowledge in organized or self-supported courses.

Specialists with a land surveyor diploma are able to solve the geodetic problems below:

* Basic land surveying jobs (determination of control points, large-scale maps, making and renewing of topographic maps);
* Preparing precise and detailed measurements for all kinds of technical jobs in economy with modern methods;
* Preparing of land surveying, geoinformation, remote sensing documents for the development of towns, villages, industrial estates and other industrial establishments.
* Planning and designing the land survey as part of the national administration;

# Structure of Training:

*Training time:* 7 semesters

*Minimum number of lessons for full-time*: 2700 hours +600 hours practicals, 600 hours + practicals for correspondent courses

*Obtainable credit points:* minimum 210

*Level of degree:* college degree (BSc)

*Specialization:* land surveying engineer specialized in land management or in geoinformatics or in land cadastre

**Forms of Education:** full-time, correspondent courses

# Educational and Examinational Requirements:

*System of knowledge tests:* Compulsory examinations are: 31 Marks within the semesters: 7-10 resp. Coverage: 7-9 resp.

Session examinations: 0

**Rules for finding educational averages:** weighted educational average

# Contents of Course

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| **Subject - Fields** | **United credit points** | **Rate within the educational activity, %** |
| Natural-scientific and engineering studies Mathematics I-III., Geometry I-II, Physics,  Informatics I-II. , Environmental studies | 36 | 17,1 |
| Economy and humanities  Economy, State and jurisprudential studies, Communication, Organization and Management | 13 | 6,2 |
| Professional subjects:  Mapping, Surveying I-II, Basics of engineering I\_II., System organization, Map Projections, Photogrammetry I-II., Geoinformatics I-II., Adjustment Calculus, Control point networks, Topography, Land registry, Large scale mapping I\_II., Land use and environmental protection | 75 | 35,7 |
| Differential professional Studies  *Specialization in Geoinformatics*: Engineering Surveying, GPS, GIS applications, Project week I-II., Engineering Surveying, GIS Management, Remote Sensing, Cartography, Geodesy  *Specialization in Land Management*: Engineering Surveying , GIS applications , Photointerpretation and remote Sensing, Project week I-II., land and urban management I-II., Organization and management 2., Urban studies, Rural and urban development  *Specialization in land cadastre*: Land registry II., Studies in civil law, Estate development, utilization of estates I-II., Estate law I-II., Land and urban management I-II., Administrative law, , land and estate evaluation, Agrarian law | 31 | 14,8 |
| Optional subjects | 10 | 4,8 |
| Practical studies (2x3, 1x1 weeks institutional practice and 7 weeks workshop practice) | 30 | 14,3 |
| Thesis | 15 | 7,1 |
| **Altogether** | **210** | **100%** |
| *Language classes* | 4 hours/week  during 4 semesters |  |

**Practical studies:** Surveying (3 weeks), Land Surveying (3 weeks), Topography (1 week), Workshop Practice (min. 10 weeks)

# State exam criteria:

*For sitting for the exam:*

* At least 195 credit points and the fulfilling of the criteria in the curriculum,
* Signature for the thesis,

*Parts of the state exam:*

* Defending of the thesis (15 credit points),
* Complex state exam ( from subjects equal to 15-30 credit points)

*Requirements of the thesis:* It should prove that the candidate is able to apply in practice the given knowledge, to gather data, to evaluate, to conclude, to form an opinion, to use specialized literature and to summarize the results.

*The result of the state exam:* the arithmetic middle of the thesis and the oral exam

*The condition of issuing the diploma:* accredited, basic level foreign language examination . *The result of the diploma:* arithmetic middle of the state exam and the weighted educational average for the whole training.

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| *Qualification of the diploma:* prominent | 4,50 – 5,00 | good | 3,50 – 4,49 |
| satisfactory | 2,50 – 3,49 | sufficient | 2,00 – 2,49 |

# Short courses offered in English:

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| Óbuda University Alba Regia Technical Faculty Institute of Geoinformatics | |
| Course name | Building Geodatabase |
| ECTS: | 3 |
| Semester: | winter / summer |
| Department: | Geoinformatics |
| Teacher: | Andrea Pődör |
| Description: | Designing of Geodatabase Spatial thinking in the practice Defining geodatabase  Defining layer structure Data integration  Building layer(s) by digitising Editing and cleaning feature set Filing up attribute tables Creating own geodatabase Validation by field work |
| Method | The course based on personal contact. The first part is conducted by teacher, it’s takes about 8-10 hours. The second part is guided by teacher, but mainly based of own work of student(s). It’s takes 10-14 hours. The third part (field practice) supervised by teacher, it’s takes about half a day. The used software is ArcGis ver. xxx. |

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| Óbuda University Alba Regia Technical Faculty Institute of Geoinformatics | |
| Course name | Data Acquisition and integration |
| ECTS: | 3 |
| Semester: | winter and summer |
| Department: |  |
| Teacher: | Dr. Tamas Jancso, Dr. Andrea Pődör, Dr. Verőné Wojtasek Marlgorzata, Dr. György Busics |
| Description: | The course gives an overview about the data acquisition methods and the derived products in surveying, GPS technology, laser scanning, photogrammetry and remote sensing. The students will get knowledge about the up-to-date sensors, evaluation procedures emphasizing the connection and integration between the different methods.  The course is separately dealing with the problem how to integrate the gained data and products into a GI system in order to give possibility to derive secondary data from the primary data sources. Upon completion of the course the students should know:  •the methods and sensors of data acquisition in surveying, GPS, laser scanning, photogrammetry and remote sensing,  •the evaluation procedures and application areas of the derived products,  •data integration procedure into a GI system. |
| Method | Distanc e-learning through Internet using the Blackboard system. Standards are : English language, 90 hours workload, 13 online contact lessons, supervision and exams executed by the providing GI institute. |

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| Óbuda University Alba Regia Technical Faculty Institute of Geoinformatics | |
| Course name | Land use and environment protection |
| ECTS: | 3 |
| Semester: | winter / summer |
| Department: | Geoinformatics |
| Teacher: | Horosz Gulyás Margit |
| Description: | Aims: The students are given knowledge about the soil set of Hungary, agriculture and nature conservation of soil using, and their connections.  Main topics:   * Land using in Europe, and in the Carpathians Basin * The climatic and environmental facilities of Europe * The land cultivation’s development and the changes of the landscape * Categories of production sites and soil types. * Plant growing and allocation systems. * Forestry. * Environment protection and nature conservation. Literature:  1. Ángyán J. szerk.: Magyarország földhasználati zónarendszerének kidolgozása az EU csatlakozási tárgyalások megalapozásához, GATE Környezet-és Tájgazdálkodási Intézet kiadása, Gödöllı,1998. 2. Dömsödi János\_ Szalai T.: Mezıgazdasági földhasználat,egyetemi jegyzet, GATE,Gödöllı,1997. 3. Katonáné Gombás K: környezet-és természetvédelem, Kézirat,NYME GEO, Jegyzetsokszorosító Részleg,Székesfehérvár,2002. 4. NormannJ.G. Pounds: Európa történeti földrajza, Osiris Kiadó, Budapest,1990. 5. Nyíri L. szerk.: Földmőveleéstan. Mezıgazdasági Kiadó Budapest,1993. 6. Rakonczay Z: Természetvédelem, Mezıgazdasági Szaktudás 7. Kiadó, Budapest, 1995. |
| Method | Project based learning. Students have to know the basic ideas of the topics and their applications on their field. |

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| Óbuda University Alba Regia Technical Faculty Institute of Geoinformatics | |
| Course name | Spatial Databases by Open Standards and Softwares |
| ECTS: | 3 |
| Semester: | winter and summer |
| Department: | Department of Geoinformation Science |
| Teacher: | NAGY, Gábor |
| Description: | * Relational databases and Database Systems * Structured Query Language (SQL) * OGC Simple Features – SQL (OGC Standard) * PostgreSQL and PostGIS sofwares * Queries with Spatial Functions and Operators * Using PostGIS Databases from desktop GIS softwares |
| Method | The theory learn by digital sources (standards, program documentations, etc.) and personal or remote meetings.  We use the related programs in the computer labs of the Faculty, but the students could use this programs in theirs own computer. |

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| Óbuda University Alba Regia Technical Faculty Institute of Geoinformatics | |
| Course name | Spatial Analysis |
| ECTS: | 4 |
| Semester: | winter / summer |
| Department: | Geoinformatics |
| Teacher: | Andrea Pődör/László Gergely |
| Description: | Aims: The basic principles, algorithms and computational methods in Geographical Information Science will be introduced. The students will be able to explain the strategy, theory and rules of data analysis, to use GIS as a tool in the practice, to handle data errors in processing data and visualizing information. The subject additionally will give an overview of GIS planning and implementation using a project-based educational approach.  Main topics: Fundamentals of spatial analysis. Simple spatial operations: distance and area calculations, spatial queries, statistical methods. Transformations: vector-raster, raster-vector. Neighbourhood functions: buffer generation, grouping, filtering.  Multiple spatial operations: vector and raster overlay, Boolean and arithmetic operations, map algebra, spatial filtering.  Digital elevation models and modelling. Spatial interpolation methods: basic, elementary and complex functions. Surface analysis. Catchment delineation.  Network analysis: location and allocation.  Spatial decision making. Examples. Cartographic modelling. General steps involved in traditional approach, Assumptions involved with this type of analysis.  Practical problems. Error handling: eliminating sliver polygons, positional and thematic accuracy, metadata, planning. Visualization.  Basics of GI project management. GIS in organisations. Future of GIS.  Literature: Compulsory reading:  1. Core Curriculum in GIScience, NCGIA, Santa Barbara, CA, 2000, <http://www.ncgia.ucsb.edu/giscc/>  Recommended reading:  1. GIS Core Curriculum for Technical Programs, NCGIA, Santa Barbara, CA, 1998, <http://www.ncgia.ucsb.edu/education/curricula/cctp/>  8. Longley, P.A. – Batty, M.: Advanced Spatial Analysis, ESRI Press, Redlands, CA, 2003. |
| Method | Project based learning. There are 6 module of lectures. Students should prepare 6 assignments during their study. Software: ArcGIS 9. In the computer lab students are working on their own, and advised by the teacher if needed. |

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| Óbuda University Alba Regia Technical Faculty Institute of Geoinformatics | |
| Course name | Geoinformation management |
| ECTS: | 2 |
| Semester: | winter / summer |
| Department: | Geoinformatics |
| Teacher: | Gergely László |
| Description: | Aims: The basic principles, methods and some practical tools in Geographical Information Management are introduced. The subject also dealing with GIS planning and implementation. Special emphasis is given to the introduction of team-work skills.  Main topics: Fundamentals of Information Management, strategic planning, basic elements of systems and influence of the environment. Basics of GIS project management, project initiation, user needs analysis, user oriented project planning and documentation, logical framework matrix, Gantt-diagram, cost-benefit analysis, data- information matrix, proposals, total quality management, change management, marketing and monitoring. Process and milestones of GIS implementation from tendering to benchmarking, piloting and continuous operation. GIS in organisations. Future of GIS.  Literature: Compulsory reading:  9. Frank A. - Raubal M. - van der Vlugt M.: PANEL - GI Compendium, Geoinfo Series nr. 21, Vienna, 2000.  Recommended readings:   1. Tomlinson, R: Thinking about GIS, ESRI Press, Redlands, California, 2003. 2. BEST-GIS: Guidelines for best practice in user interface for GIS, Genoa, Italy, 1998. 3. Calkins H. et al.: Geographic Information System Development Guides, NCGIA CC, Unit 136. 4. Nebraska Guidebook for a Local Government Multipurpose Land Information System, [http://www.calmit.unl.edu/gis/LIS\_Stds\_Intro.html,](http://www.calmit.unl.edu/gis/LIS_Stds_Intro.html) 2000. 5. NCGIA Core Curriculum, Volume 3, SE FFFK, Székesfehérvár, 1994. |
| Method | Project based learning. Students should prepare step-by-step a GI project proposal and submit at the end of the study. Each step involves a written assignment and an oral presentation, both advised by the teacher. |

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| Óbuda University Alba Regia Technical Faculty Institute of Geoinformatics | |
| Course name | Geodesy |
| ECTS: | 3 |
| Semester: | winter / summer |
| Department: | Geodesy and Surveying |
| Teacher: | Lóránt Földváry |
| Description: | 1) Gravity, gravitation, centrifugal force, tides  2) Gradient, divergence, rotation  3) Fundamentals of potential theory  4) Normal gravity field, spheroid, anomalies and disturbances  5) Spherical harmonics  6) Observation techniques of geodesy (satellite geodesy, gravimetry, astronomic geodesy)  7) Mathematical and physical methods of determination and fit an ellipsoid to The the geoid  8) Methods of geoid determination  9) Detemination of height above geoid |
| Method | The course based on personal contact, using the Blackboard system. The lectures are supported by practical calculations, making use of basic programming skills. |

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| Óbuda University Alba Regia Technical Faculty Institute of Geoinformatics | |
| Course name | Adjustment Calculus |
| ECTS: | 4 |
| Semester: | winter / summer |
| Department: | Geodesy and Surveying |
| Teacher: | Lóránt Földváry |
| Description: | 1) Fundamentals of statistics  2) Adjustment of repeated measurements  3) Least Squares Method  4) Adjustment of indirect measurements  5) Adjustment of networks  6) Determination of extreme value of a function with condition  7) Adjustment of direct measurements  8) Adjustment of traverse network  9) Regression analysis |
| Method | The course based on personal contact, using the Blackboard system. Every lecture is exemplified with a practice, using both calculator and computer. |