**Course title:** Environmental Impact Assessment (0604446)

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| **1- Course information** |
| **Credit hours** | 3 | **Level** | MSc | **Pre-requisite** | N/A |
| **Lecturer** | Dr. Jawad Al-Bakri | **Office number** | 116 | **Office phone** | 22449 |
| **Course website** | http://www2.ju.edu.jo/sites/Academic/jbakri/default.aspx | **E-mail** | jbakri@ju.edu.jo, jawad.t.albakri@gmail.com | **Place** | GIS Lab15:30-17:00 (Mon, Wed) |
| **Office hours** | **Sunday Monday Tuesday Wednesday Thursday**11:00-13:00 15:00-15:30 12:00-13:00 ARS, JV 15:00-15:30 11:00-13:00 |

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| **2- Course Description** |
| The course focuses on the process of EIA (screening, scooping, assessment, mitigation, review and auditing) and the skills needed for EIA. Methods of EIA are described in details with focus on the most recent and developed ones. Detailed EIA of water, air, soil, vegetation, and evaluation are included in this course. Examples on models of prediction and evaluation and the use of standards in EIA are also included in this course. Special attention is given to the impact analysis and mitigation in relation to laws, regulations and environmental standards. |

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| **3- Learning Objectives** |
| The general objective of this course is to provide the student with the main steps of EIA process in Jordan and overseas. Specific objectives and outcomes of the course are:1. To provide the students with skills needed to work in the field of EIA.
2. To enable the students to implement the scientific and practical approach in scoping, team formulation and TOR writing.
3. To introduce the students to the advanced methods of impact identification and analysis.
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| **4- Intended Learning Outcomes (ILOs):** |
| Successful completion of the course should lead to the following outcomes:**A. Knowledge and Understanding:** A1- EIA importance and roles in sustainable development and natural resources conservation.A2- Process of EIA and the stages included.A3- Valued environmental components (VEC).A4- TOR writing based on VEC and outputs from scoping.**B. Intellectual, Analytical and Cognitive Skills:** B1- Methods of environmental impact identification.B2- Importance of impact prediction and the main types of models deployed in EIA.B3- Judgment on weights of VEC in relation to project location and components.**C. Subject- Specific Skills:** C1- EIA process for air, water, noise, flora and fauna and soils.C2- TOR structure and writing.C3- Basis for EIA review and the main contents of EIS.**D. Transferable Key Skills:** D1- Standards and regulations governing EIA in Jordan.D2- Identification of projects that require full or partial EIA.D3- Procedures for scoping, tendering and formation of EIA team.D4- Selection of impact identification methods in the light of available resources and size of the project. |

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| **5- ILOs: Learning and Evaluation Methods** |
| **ILO/s** | **Learning Methods** | **Evaluation Methods** |
| **A**. Knowledge and Understanding (**A1-A3**) | Lectures, Discussions and take home exercises. | Exam, Reports. |
| **B**. Intellectual Analytical and Cognitive Skills (**B1-B3**) | Lectures and Discussions | Exam, Reports. |
| **C**. Subject Specific Skills (**C1-C3**) | Lectures, Discussions and students presentations. | Exam, Reports. |
| **D**. Transferable Key Skills (**D1-3**) | Lectures, Discussions and students projects | Exams, Reports. |

| **6- Course Contents** |
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| **Lecture (s) /Week** | **Subject** | **Sources** | **ILOs** |
| 2/1st  | **Topic 1- Introduction and review of EIA process:** Definition of EIA, requirements, types of impacts, types of projects, EIA process, EIA process in Jordan: Environment Protection Law, EIA system 37/2005. | 9-49-69-7 | A1-A4 |
| 4/2nd , 3rd | ***Topic 2- EIA Process:***Screening, screening process in Jordan and projects categories, scoping, planning and management of impact studies, Conceptual approach for environmental impact studies, Proposal development, Interdisciplinary team formation and writing of TOR, Team selection and duties, General study management. | 9-29-7 | A2-A4D2, D3 |
| 6/4th -6th  | ***Topic 3- Methodologies and impact identification in EIA:**** Checklist methodologies: Simple, Descriptive, Questionnaire and TOC checklist.
* Interaction-Matrix methodologies: Simple matrices, stepped matrices, time-dependent matrix, magnitude matrix, Leopold matrix, weighted matrix.
* Network methodologies: linear networks, Sorensen network, Digraphs.
* Quantitative methods, expert systems, GIS and remote sensing (spatial databases and web-based sources of data, spatial analysis and their uses in EIA.
* Models and their roles in EIA.
 | 9-19-39-4 | A3B1-B3 |
| 4/7th – 8th  | ***Topic 4- Scoping and TOR writing (student work):***Process of scoping and circulation of information, involvement of stakeholders, scoping sessions: roles of proponent and stakeholders, methods for public involvement, socioeconomic dimensions and their evaluations, TOR writing, case studies.**Mid-term Exam** | 9-29-7 | C2, C3 |
| 4/9th – 10th  | **Topic 5- EIA of air quality:** * Basic information on air quality issues, air pollutants, air pollution sources and effects, Jordanian legislation and regulations of air quality.
* Conceptual approaches for addressing air environment impacts.
* Mass-balance approach for prediction of impacts on air quality.
* Box-model approaches: fixed box model, background concentration.
* Dispersion models: Gaussian models, Plume equation, ground and elevated sources.
 | 9-19-2 | C1, B2, D1, D4 |
| 6/11th -13th  | ***Topic 6- Prediction and assessment of impacts on the water quality**** Pollutants and their sources, surface-water quantity and quality, discharge limits. Jordanian standards for water quality and reuse.
* Conceptual approach for EIA of surface water, Impact analysis by project.
* Prediction and modeling of surface water environment: Mass-balance approach and mixing zone model, Mathematical modeling approaches: Dissolved oxygen models, temperature models, mall lake model, runoff models, and erosion and sedimentation models.
* Prediction and modelling for groundwater quality
 | 9-19-29-5 | C1, B2, D1, D4 |
| 2/14th  | ***Topic 7- Prediction and assessment of impacts on the noise environment*** * Basic information on noise: definition and sources, sound pressure, power, and intensity. Threshold levels of noise and human hearing. Regulations and standards.
* Noise scale and rating methods:Equivalent sound level (Leq), Day –night average sound level (DNL, Ldn), Community Noise Equivalent Level (CNEL), Single Event Noise Level (SENEL).
* Mitigation and noise attenuation: wave divergence and excess attenuation. Attenuation by barriers, atmosphere and vegetation.
 | 9-19-2 | C1, B2, D1, D4 |
| 2/15th  | ***Topic 8- Prediction and assessment of impacts on the soil, flora and fauna**** + - Background information, key legislations.
* Conceptual approach for addressing soil and biological impacts
* Indicators and indices.
 | 9-19-2 | C1, B2, D1, D4 |
| 2/16 | **Final Hour Exam** |  |  |

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| **7- Intended Learning Methods** |
| The course will be structured in lectures, discussions and students’ presentations and projects. The course comprises overviews, from general understanding to expert knowledge on key topics, and learning is based on case studies for TOR and impact identification. The learning methods will include the use of power point slides, word and pdf files with many EIA projects from Jordan to enable the students to understand the process of EIA and to build skills for the work or research in this vital area. Students are asked to identify VEC and the type of projects that might affect them. Also, each student will prepare a TOR based on an EIA project in Jordan or overseas. Students are also encouraged to attend scoping sessions that usually take place on monthly basis by the Ministry of Environment with participation of public, NGO’s and private sector. |

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| **8- Evaluation** |
| **Evaluation component** | **Points %** | **Date/Schedule** |
| Midterm Exam  | 30 | 17/11/2013 |
| Student presentations, home works and EIA projects | 20 | 7 days after each practical session |
| Final Exam | 50 | Week 16, following the time schedule announced by the Registration. |

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| **9- Reference (s)** |
| 9-1 Morris, P. and Therivel R. 2009. Methods of Environmental Impact Assessment (Natural and Built Environment Series), 3rd edition (London &New York: Routledge)9-2 Canter, L. W. 1997. Environmental Impact Assessment, 2nd edition (McGraw-hill series in water resources and environmental engineering).9-3 Glasson, J., Therivel, R. and Chadwick, A. 1999. Introduction to Environmental Impact Assessment, 2nd edition (London: UCL Press).9-4 Wathern, P., 1992, Environmental Impact Assessment: Theory and Practice, (London: Routledge).9-5 FAO Irrigation and Drainage Paper <http://www.fao.org/docrep/V8350E/V8350E00.htm>9-6 Jordan Law for Environment (Law 52/2006 or as upgraded)9-7 Jordan EIA System 37/2005 (or as upgraded) |

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| **10- Intended Grading** |
| Grading will be based on class performance, i.e. average and standard deviation. However, the minimum to pass the course is 60 out of 100. Grade A is usually given to the mark that exceeds 82. |

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| **11- Important Roles** |
| Attendance is obligatory for all students, as it will affect the overall performance of the student. According to UOJ regulations, students are not allowed miss more than 15% of lectures, or otherwise their results will be incomplete. |