Form No:ÜY-FR-0319

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|  | **ECTS Course Description Form** |
| **PART I ( Senate Approval)** |
| **Offering School**  | **Engineering** |
| **Offering Department** | **Civil Engineering** |
| **Program(s) Offered to** | **Civil Engineering** | Elective |
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|  |  |
| **Course Code**  | CE 483 |
| **Course Name** | Engineering for Sustainable Development |
| **Language of Instruction** | English |
| **Type of Course** | *Lecture* |
| **Level of Course** | **Undergraduate** |
| **Hours per Week** | **Lecture: 3** | **Laboratory:** | **Recitation:**  | **Practical: 1** | **Studio:** | **Other:** |
| **ECTS Credit** | **5** |
| **Grading Mode** | **Letter grade** |
| **Pre-requisites** | **Open to all 3rd and 4rth year Engineering Students** |
| **Co-requisites** | **-** |
| **Registration Restriction** | -  |
| **Educational Objective** | 1.To give the definition of Sustainability 2.To identify the themes of sustainability 3.To evaluate the performance of the engineering branches in terms of sustainability aspects4.To examine three pillars of sustainability (Economy, Environment, Society). 5.To explore the relation between sustainability and main phenomena including global warming, climate change, water crises, energy6. To evaluate the governments’ embracement of sustainability7. To analyse the cost/ benefit of sustainability aspects in engineering projects |
| **Course Description** | This course deals with the sustainability aspects and concepts in engineering. It aims to enables future engineers to develop an understanding of the ways and methods in which the sustainability is embraced in governments and the authorities’ thinking and including in policy. It educated the future engineers in how to impede sustainability in engineering themes. The topics will investigate the sustainability in design, improving adaptation to climate change impacts, coupled human and environmental interaction, materials recycling and wastes, energy and water consumption, infrastructure evaluation and other engineering projects. The course also includes a design and optimizations of sustainable model cities including cost benefit and multi criteria analysis to be applied for real case mega projects. |
| **Learning Outcomes**  | **LO1** | 1. Learn the definition of sustainability2. Identify the three Themes of Sustainability and its cross relations3. Apply concept of sustainability on engineering projects and main phenomena4. Evaluate the sustainable aspects in water, energy, waste, materials and infrastructure5. Conduct a cost benefit analysis of sustainable projects6.Learn the basic strategies in decision making system with the optimization criteria |
| **LO2** |
| **LO3** |
| **LO4** |
| **LO5** |
| **LO6** |
| **n..** |
| **PART II ( Faculty Board Approval)** |
| **Basic Outcomes (University-wide)** | **No.** | **Program Outcomes** | **LO1** | **LO2** | **LO3** | **LO4** | **LO5** | **LO6** |
| **PO1** | **Ability** to communicate effectively and write and present a report in Turkish and English.  | 🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸🗸 🗸 🗸 🗸 🗸 🗸 |
| **PO2** | **Ability** to work individually, and in intra-disciplinary and multi-disciplinary teams. |
| **PO3** | **Recognition** of the need for life-long learning and **ability** to access information , follow developments in science and technology, and continually reinvent oneself. |
| **PO4** | **Knowledge** of project management, risk management, innovation and change management, entrepreneurship, and sustainable development. |
| **PO5** | **Awareness** of sectors and **ability** to prepare a business plan. |
| **PO6** | **Understanding** of professional and ethical responsibility and **demonstrating** ethical behavior. |
| **Faculty Specific Outcomes** | **PO7** |  |
| **PO8** |  |
| **PO9** |  |
| **PO10** |  |
| **PO11** |  |
| **PO12** |  |
| **Discipline Specific Outcomes (program)** | **PO13** |  |
| **PO14** |  |
| **PO15** |  |
| **PO16** |  |
| **PO17** |  |
| **PO18** |  |
| **Specialization Specific Outcomes** | **PO N….** |  |
| **PART III ( Department Board Approval)** |
| **Course Subjects, Contribution of Course Subjects to Learning Outcomes, and Methods for Assessing Learning of Course Subjects** | **Subjects** | **Week** |  | **LO1** | **LO2** | **LO3** | **LO4** | **LO5** | **LO6** |
| **S1** | 1 | Definition of sustainabilty | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S2** | 2 | Sustainability main pillars and three themes | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S3** | 3 | Sustainable globe and global warming | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S4** | 4 | Climate change (Cause- Effect) and scenarios | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S5** | 5 | Sustainable Water Resources management | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S6** | 6 | Sustainability and renewable energy | *D1-D2-D3*  | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S7** | 7 | Sustainability and engineering projects and infrastructure | *D1-D2-D3* | *D1-D2-D3*  | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S8** | 8 | Decision Taking strategies and sustainable aspects | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S9** | 9 | Optimization models and multi criteria analysis | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S10** | 10 | Cost benefit analysis techniques in engineering projects | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S11** | 11 | Two-Dimensional Flow of Real Fluids | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S12** | 12 | Governments and the authorities’ thinking sustainable policy and measures | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S13** | 13 | Advances in Human-Environment interaction | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **S14** | 14 | Advance aspects in sustainable Engineering | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* | *D1-D2-D3* |
| **Assessment Methods, Weight in Course Grade, Implementation and Make-Up Rules**  | **No.** | **Type** | **Weight** | **Implementation Rule** | **Make-Up Rule** |
| **A1** | **Exam** | *60%* | *No electronic devices are allowed in the examinations except for calculators.* | If the reason for not taking the exam is justified by the school, the student is informed about the time of the make-up exam. |
| **A2** | **Quiz** | *10%* | *The time and subject announce to the students at least one week in advance.* | There is no compensation for the quizzes. |
| **A3** | **Homework** | *10%* | *Homeworks are given by announcing deadline. Homeworks that are submitted after the deadline are not accepted.* | There is no compensation for the Homeworks. |
| **A4** | **Project** | *20%* | *Conduct a sustainable design for one of engineering projects and apply the DSS, MCA strategies in designing the project* | There is no compensation for the Homeworks. Project should be submitted based on a pre determined dead line |
| **A5** | **Report** |  | - | - |
| **A6** | **Presentation** |  | - | - |
| **A7** | **Attendance/ Interaction** |  | - | - |
| **A8** | **Class/Lab./****Field Work** |  | - | - |
| **A9** | **Other** |  |  |  |
| **TOTAL** | **100%** |
| **Evidence of Achievement of Learning Outcomes** | Letter grades determined by weighting on the specified percentages on the grades that are taken from exams, quizzes and homeworks by the students. The teaching staff can make changes in the student's grades. |
| **Method for Determining Letter Grade** |

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| Equivalent number range | 100 | 90-100 | 87-89 | 84-86 | 80-83 | 77-79 | 74-76 | 70-73 | 67-69 | 64-66 | 60-63 | 0-59 |
| GPA | 4.00 | 4.00 | 3.70 | 3.30 | 3.00 | 2.70 | 2.30 | 2.00 | 1.70 | 1.30 | 1.00 | 0.00 |

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| **Teaching Methods, Student Work Load** | **No** | **Method** | **Explanation** | **Hours** |
| ***Time applied by instructor*** |
| **1** | **Lecture** |  | 3x14 |
| **2** | **Interactive Lecture** |  | - |
| **3** | **Recitation** |  | - |
| **4** | **Laboratory** |  | - |
| **5** | **Practical** |  | 1x14 |
| **6** | **Field Work** |  | - |
| ***Time expected to be allocated by student*** |
| **7** | **Project** |  | *-* |
| **8** | **Homework** |  | 16 |
| **9** | **Pre-class Learning of Course Material**  |  | 32 |
| **10** | **Review of Course Material** |  | 56 |
| **11** | **Studio** |  | - |
| **12** | **Office Hour** |  | - |
| **TOTAL** |  *160* |
| **IV. PART** |
| **Instructor** | **Name** | ZIYAD ABUNADA |
| **E-mail** | Ziyad.abunada@antalya.edu.tr |
| **Phone Number** | *05051563330* |
| **Office Number** | *A1-65* |
| **Office Hours** | It will be determined during the semester. |
| **Course Materials** | **Mandatory** |  |
| **Recommended** | Industrial Ecology and Sustainable Engineering, (2009), T. E. H Graedel., Braden R. Allenby, ISBN-10: 0136008062 • ISBN-13: 9780136008064. ©2010 • Pearson • 352  |
| **Other** | **Scholastic Honesty** | Violations of scholastic honesty include, but are not limited to cheating, plagiarizing, fabricating information or citations, facilitating acts of dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Any for of scholastic dishonesty is a serious academic violation and will result in a disciplinary action. |
| **Students with Disabilities** | Reasonable accommodations will be made for students with verifiable disabilities. |
| **Safety Issues**  | The course does not require any special safety precautions. |
| **Flexibility** | Circumstances may arise during the course that prevents the instructor from fulfilling each and every component of this syllabus; therefore, the syllabus is subject to change.  Students will be notified prior to any changes.  |