Republic of Iraq

Ministry of Higher Education & Scientific Research

Supervision and Scientific Evaluation Directorate

Quality Assurance and Academic Accreditation

International Accreditation Dept.

Academic Program Specification Form For The Academic Year 2017-2018

Universitiy: Baghdad

College : Engineering

Number Of Departments In The College : 12 Twelve

Date Of Form Completion : May – 1/9/2017

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Dean ’s Name

Date : 1 / 9 / 2017

Signature

Dean ’s Assistant For Scientific Affairs

Date : 1 / 9 / 2017

Signature

The College Quality Assurance And University Performance Manager

Date : 1 / 9 / 2017

Signature

Quality Assurance And University Performance Manager

Date : 1 / 9 / 2017

Signature

**TEMPLATE FOR COURSE SPECIFICATION**

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW |

**COURSE SPECIFICATION**

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| This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification. |

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| Engineering College | ***1. Teaching Institution*** |
| University of Baghdad/ Department of Surveying | ***2. University Department/Centre*** |
| Satellite Geodesy\_GNSS | ***3. Course title/code & Description*** |
| BSc in Surveying Eng. (4th Stage) | ***4. Programme(s) to which it Contributes*** |
| Annual | ***5. Modes of Attendance offered*** |
| 2017/2018 | ***6. Semester/Year*** |
| 60 | ***7. Number of hours tuition (total)*** |
|  | ***8. Date of production/revision of this specification*** |
| ***9. Aims of the Course*** | |
| This course is prepared for undergraduate students. It starts with general introduction about the development of global surveying techniques and this includes different subjects, such as optical global triangulation, electromagnetic global trilateration, and satellite-based positioning. Furthermore, different positioning and navigation satellite systems are presented and highlited in this course. After this general introduction of the GNSS, the Global Positioning System is dealt with in details. Additionally, this course focuses on further three main themes. These are: International GNSS Service (IGS) (as it is the main source of GNSS data and products); GNSS observables; Finally, Mathematical models for GPS | |

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| ***10·*** ***Learning Outcomes*** |
| The fourth year students should deliver a complete knowledge and practical experience of applying the algorithms of space geodesy to introduce geodetic positions and geodetic networks. Furthermore, the students know how to find the optimum procedure for determination of the terrestrial positions in different applications. |
| ***11.*** ***Teaching and Learning Methods*** |
| Lectures, tutorials, and reports |
| ***12. Assessment Methods***  Exams (more than 1 exam for each semester+ several quizzes), technical reports. |
| ***13. Grading Policy***  Annual grades from exams, reports, and grade from the final exam |

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| ***14. Course Structure*** | | | |
|  |  |  | Week |
| Introduction and definitions |  |  | 1 |
| GNSS: Theory and Principles |  |  | 2 |
| Development of Global Positioning Techniques  Introduction to GNSS- GPS, GLONASS, Galileo, Compass (or Beidou- & more |  |  | 3 |
| Global Positioning System Basics  GPS segments:  The Control Segment  Monitor stations, Master control station, Ground antennas |  |  | 4 |
| Space Segment:  GPS satellite Constellation  GPS satellite Categories |  |  | 5 |
| User Segment |  |  | 6 |
| GPS satellite signals structure:  Introduction:Physical fundamentals, Propagation effects, Frequency standards |  |  | 7 |
| Signal Structure:  Signal design, Carrier frequency, Ranging code |  |  | 8 |
| Pseudo-Random Noise (PRN) codes and modulation:  C/A code, P code, L2C code, L5C code, and L1C code |  |  | 9 |
| Navigation Messages (NAV) |  |  | 10 |
| GPS Satellite Orbit  Satellite Orbit Description  Keplerian Motion  Perturbed Motion |  |  | 11 |
| GPS Satellite Orbit Modelling  Keplerian Orbit  Perturbed Orbit |  |  | 12 |
| The orbital elements:  Categories of the orbital information  The Almanac Data  The Broadcast Ephemeris  The Precise Ephemeris |  |  | 13 |
| Reference Systems  GNSS Coordinate System  Geodetic Datum  World Geodetic System, PZ-90, North American Datum 1983  International Terrestrial Reference Frames (ITRF)  International Terrestrial Reference System ([ITRS](http://itrf.ensg.ign.fr/itrs_itrf.php)) |  |  | 14 |
| First semester exam |  |  | 15 |
| Time systems  Time systems based on Earth's rotation  Time systems based on Earth's revolution  Time systems based on Atomic Oscillation  GPS Time system |  |  | 16 |
| International GNSS Service (IGS):  IGS Data and Products  IGS Data Centers  IGS mail |  |  | 17 |
| IGS tracking network  The IGS Analysis Center Coordinator (ACC) (<http://acc.igs.org/>):  IGS Analysis Centers (ACs):  [CODE](http://igscb.jpl.nasa.gov/igscb/center/analysis/code.acn), [EMR](http://igscb.jpl.nasa.gov/igscb/center/analysis/emr.acn), [ESA](http://igscb.jpl.nasa.gov/igscb/center/analysis/esa.acn), [GFZ](http://igscb.jpl.nasa.gov/igscb/center/analysis/gfz.acn), [JPL](http://igscb.jpl.nasa.gov/igscb/center/analysis/jpl.acn), [MIT](http://igscb.jpl.nasa.gov/igscb/center/analysis/MIT_acn.html), [NGS](http://igscb.jpl.nasa.gov/igscb/center/analysis/noaa.acn), [PDR](http://igscb.jpl.nasa.gov/igscb/center/analysis/pdr.acn), [SIO](http://igscb.jpl.nasa.gov/igscb/center/analysis/sio.acn) |  |  | 18 |
| Atmospheric effects (Ionospheric and Tropospheric refractions)  Relativistic effects |  |  | 19 |
| Satellite and receiver antenna phase centre offsets and variation (relative and absolute) |  |  | 20 |
| Multipath effects |  |  | 21 |
| Mathematical models for positioning  Single Point Positioning  Point Positioning with Code Range |  |  | 22 |
| Point Positioning with Carrier Phase  Precise Point Positioning |  |  | 23 |
| Static Point Positioning  Kinematic Point Positioning |  |  | 24 |
| Differential Positioning  Differential Positioning with Code Range  Differential Positioning with Carrier Phase |  |  | 25 |
| Relative Positioning  Basic Concept  Phase Differences |  |  | 26 |
| Static Relative Positioning  Kinematic relative Positioning |  |  | 27 |
| Relative Positioning  Single-differences, Double-differences, Triple-differences.  Between-receives difference, Between-satellites difference, Between-time difference. |  |  | 28 |
| Single Point against Relative Positioning  Comparison between Relative positioning and differential positioning |  |  | 29 |
| Second semester exam |  |  | 30 |

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| ***15. Infrastructure*** | | |
| Satellite Geodesy  Basic of GNSS | Required reading:  · CORE TEXTS  · COURSE MATERIALS  · OTHER | |
| NA | Special requirements (include for example workshops, periodicals, IT software, websites) | |
| NA | Community-based facilities  (include for example, guest  Lectures , internship , field studies) | |
| ***16. Admissions*** | | |
|  | | Pre-requisites |
| 15 | | Minimum number of students |
| 30 | | Maximum number of students |
| Dr. Oday Y. M Zeki | | ***17. Course Instructors*** |

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