ISTANBUL TECHNICAL UNIVERSITY　　　*INTERNATIONAL UNIVERSITY OF SARAJEVO*

Protocol on the Establishment of International

Undergraduate Joint Program

in Mechanical Engineering

between

ISTANBUL TECHNICAL UNIVERSITY,

TURKEY

and

INTERNATIONAL UNIVERSITY OF

SARAJEVO,

BOSNIA AND HERZEGOVINA

SECTION 1

GENERAL TERMS

ARTICLE 1 – Purpose and Background

(1) The purpose of this Protocol is to define the principles and procedures governing the mutual structuring of an international Bachelor of Science joint program between Istanbul Technical University (hereafter referred to as "ITU"), Turkey, and International University of Sarajevo (hereafter referred to as "IUS"), Bosnia and Herzegovina (both will be referred to as the "parties" or "institutions") comprising the programs of "Mechanical Engineering" at ITU and "Mechanical Engineering" at IUS.

(2) The institutions agree, by this Protocol, to collaborate with one another on a non-exclusive basis in offering a mutual transfer program of study that will prepare students of both institutions to study their preparatory program (hereinafter: ELS) and first two academic years at IUS and then continue for third and fourth year at ITU, in order that they can complete a Bachelor of Science in Mechanical Engineering (hereinafter referred to as "ME") at ITU and a Bachelor of Science in Mechanical Engineering at IUS simultaneously.

ARTICLE 2 – Scope

(1) Terms and conditions defined in this Protocol apply to student admission, curriculum, exams and assessment, attendance, leave of absence, maximum time limits, graduation requirements, academic failure, diplomas, tuition fees, and other issues related to the joint program between ITU and IUS.

ARTICLE 3 – Legal Basis

(1) This Protocol has been prepared in accordance with (a) Higher Education Law No. 2547, published in the Official Gazette dated 6.11.1981, numbered 17506, (b) Regulation about joint programs at Turkish Higher Education Institutions, published in the Official Gazette on 06.10.2016, numbered 29849, (c) Regulation about the Transfer between Associate Degree and Bachelor's Degree Programs, Double Major and Minor Programs and Course Credit Transfers between Institutions of Higher Education, published in the Official Gazette dated 24.04.2010, numbered 27561. (d) Regulation about joint programs at ITU, published in the Official Gazette dated 07.03.2018 numbered 30353 and (e) in accordance with the Article 49 of the Law on Higher Education [Official Gazette of Canton Sarajevo no. 33/17] and other relevant regulations concerning the operations of IUS.

(2) ITU and IUS shall have authority and oversight with respect to all matters regarding legal or academic explanations of this protocol, degree programs including but not limited to admission and registration processes, tuition and fees (including increases and in- state/out-of-state rate determinations), conferring of degrees and maintenance of all of their own official student records. Final decisions regarding IUS's participation in the Program shall be made through a comprehensive administrative process by approval of the Ministry of Education, Science and Youth of Canton Sarajevo, Bosnia and Herzegovina.

(3) Admission and placement of ITU students into the Program will be carried out by the Measurement, Selection and Placement Center (hereinafter referred to as "OSYM") in accordance with the Turkish regulations to which ITU is subject to and, the agreed admissions standards established by ITU and OSYM for ITU to implement its admission procedures, as required by Turkish regulations, in accordance with the OSYM timetable.

ARTICLE 4 – Definitions

(1) The concepts and terms used in this Protocol are defined as follows:
"ABET" : Accreditation body for engineering and technology programs
"AICE" : Cambridge Advanced International Certificate of Education
"B.S." : Bachelor of Science
"ME" : Mechanical Engineering
"ELS" : English Language School
"IB" : International Baccalaureate
"iBT" : Internet Based Test
"ITU" : Istanbul Technical University, Republic of Turkey
"IUS" : International University of Sarajevo, Bosnia and Herzegovina
"OSYM" : Measurement, Selection and Placement Center
"TOEFL" : Test of English as a Foreign Language
"YOK" : Council of Higher Education of Turkey
"YKS" : Exam for Higher Education Institutions

ARTICLE 5 – Approval of Council of Higher Education of Turkey

(1) This protocol will become active once it has been approved by the Turkish Council of Higher Education (YÖK). Any changes or alterations to this document will also need an approval from YÖK.

SECTION 2
ADMISSIONS

ARTICLE 6 – Student Quotas

(1) The number of students with Turkish and non-Turkish citizenship that will be

admitted to the joint program each year will be determined jointly by ITU and IUS, and YÖK will be notified for approval. Unless there is a written modification by both institutions,

a) the maximum number of students holding Turkish citizenship to be admitted to the joint program by YKS exam will be fifteen (15) in any given year.

b) the maximum number of students holding Bosnian citizenship to be admitted to the joint program will be fifteen (15) in any given year.

c) the maximum number of transfer students from other departments to be admitted to the joint program will be five (5) in any given year. The application requirements for the relevant students are given in ARTICLE 10.

d) the maximum number of international students to be admitted to the joint program will be 50% out of the total number of annual student quota.

ARTICLE 7 – Admissions of Students holding Turkish citizenship

(1) Students will be placed in the "Mechanical Engineering" joint program by OSYM according to their YKS exam scores upon completion of secondary education in Turkey.

(2) Students will be placed according to the "Quantitative" YKS exam score and, unless declared otherwise, students will be chosen from the top 30000 students in this exam score type.

(3) Student admission criteria shall conform to the norms set down by the appropriate accrediting body with respect to English proficiency as defined in ARTICLE 15.

ARTICLE 8 – Admission of Foreign Students

(1) Foreign students should fulfill the conditions required by ITU in accordance with the ITU Senate Regulations dated 19.04.2016 and numbered 631, entitled as "Regulations for the Application and Registration-Acceptance of Foreign Students to the Undergraduate Programs" to apply and get accepted into the program.

(2) Foreign student admission criteria shall conform to the norms set down by the appropriate accrediting body with respect to English proficiency as defined in ARTICLE 15.

ARTICLE 9 – Admissions of Students holding Bosnian citizenship

(1) Students who are holding Bosnian citizenship should fulfill the conditions listed in public vacancy for enrollment of undergraduate students and those required by the Law on Higher Education of Sarajevo Canton. With the condition that the high

school graduation score is at least 3.0/5.0 on the high school transcript obtained in Bosnia and Herzegovina, the applicant is entitled to sit for the entrance exam organized by the IUS committee from the relevant field. The top 15 students who achieved the best total results (average high school score & total points from the entrance exam) will be allowed to apply for enrollment to joint program.

(2) Students holding Bosnian citizenship admission criteria shall conform to the norms set down by the appropriate accrediting body with respect to English proficiency as defined in ARTICLE 15.

ARTICLE 10 – Admission of Transfer Students from Other Programs into the Joint Program

(1) Any undergraduate student enrolled in ITU or IUS interested in transferring into the joint program may be considered for admission according to the Regulation about the Transfer between Associate Degree and Bachelor's Degree Programs, Double Major and Minor Programs and Course Credit Transfers between Institutions of Higher Education, published in the Official Gazette dated 24.04.2010, numbered 27561, if they have a cumulative GPA from the previous department or institution(s) of at least 3.0 (out of 4.0) (or the equivalent) and satisfy an interview process of both institutions.

(2) All students admitted in the program are required to achieve adequate English language proficiency as defined in ARTICLE 15.

SECTION 3
PROGRAM FEES

ARTICLE 11 – Tuition and Fees

(1) The joint program student is obliged to pay the fees to IUS within the scope of the study period in the Bosnia and Herzegovina as declared by IUS for the relevant academic years along with the ELS fees if attending English Preparatory school. IUS shall announce and collect all tuition and/or fees required to be paid by the students while they are studying at IUS. IUS may establish an international student development fund applicable to students of joint program. Neither institution shall have any liability to the other for any such uncollected student tuition and/or fees.

(2) The joint program student is obliged to pay the fees to ITU within the scope of the study period in Turkey as declared by ITU for the relevant academic years. ITU shall announce and collect all tuition and/or fees required to be paid by the students while they are studying at ITU.

(3) While taking courses out of their home countries, all students will be responsible

for all of their own living costs, including but not limited to: (a) transportation; (b) room and board expenses; (c) medical insurance (all students visiting IUS will be required to purchase IUS's health insurance before assuming their studies at IUS) and health service fees; (d) textbooks; (e) clothing; (f) personal and miscellaneous expenses; and (g) passport, visa and residence permit costs. IUS and ITU bear no responsibility for providing funds to a student for any purpose.

(4) Prior to the beginning of their studies at IUS , students will be required to verify that each has sufficient means of support for the duration of each stay at IUS.

(5) To the extent available, each institution will offer on-campus housing (upon availability) and meal plans to students at additional cost and based upon their regular rates. Each institution will also provide assistance to the students upon request with locating available off-campus housing.

(6) Annual increase rates will be determined and announced jointly by ITU and IUS.

ARTICLE 12 – Tuition Fee Payment Procedure

(1) The annual tuition fee of the joint program will be paid in accordance with each institution's procedures. Tuition will be paid in two equal installments. First payment will be made at the time of registration at the beginning of academic year, the second payment will be made at the start of second semester.

ARTICLE 13 – Scholarships

(1) Unless specifically authorized by the partner institution, neither institution will make any representations or offer any guarantees to prospective students about the likelihood of awards of financial aid or scholarships or student employment at the other institution.

SECTION 4
THE CONTENT OF THE PROGRAM

ARTICLE 14 – Duration of Study

(1) The duration of study in the joint program will be four (4) academic years. The maximum time limit for a student to complete the 4-year joint program will not exceed seven (7) academic years.

(2) The Freshman/1st and Sophomore/2nd Academic years of the joint program will be carried out at IUS while the Junior/3rd and Senior/4th Academic years will be carried out at ITU. ELS classes will be given at IUS.

ARTICLE 15 – Medium of Instruction

(1) The medium of instruction in the joint program is English. All students registered in the joint program are required to achieve an adequate score in one of the English language proficiency tests offered by ITU or IUS. Students should fulfill the English language requirements of IUS to be able to attend courses at IUS starting from their freshmen/1st academic year. Prospective students applying for admission to the joint program shall be expected to have equivalent English language proficiency as other international students applying to and accepted by IUS by the time they take courses in the joint program.

(2) The required minimum score to start the program is 65/100 for the ITU proficiency test.

(3) The required minimum score to start the program at IUS is 75/100 for the placement test and minimum 65/100 for the proficiency test.

(4) Those students who cannot meet the language proficiency requirement will have an intensive language program at IUS. The maximum duration of the intensive language program is two (2) years.

(5) Students with Turkish citizenship who cannot meet the language proficiency requirements by the end of two years may be placed into a program where the medium of instruction is Turkish by OSYM, depending on their YKS score achieved in the relevant year.

(6) In the following cases, prospective students will be exempted from the ELS Proficiency Exam if they have:

   a) passed TOEFL iBT with 79 points and above

   b) obtained a high school/BA/MA diploma/degree in a native English speaking country

   c) high-school diploma from one of the internationally recognized English medium programs below:

   AICE diploma : Cambridge Advanced International Certificate of Education
   IB diploma   : International Baccalaureate

ARTICLE 16 – Academic Failure

(1) Students of the joint degree program who are dismissed from any of the higher education institutions on grant of academic failure shall be dismissed from the joint degree program according to Regulation of YÖK published in the Official

Gazette on 06.10.2016, numbered 29849.

(2) A student who is dismissed from one of the universities for any other reason than academic failure is also dismissed from the relevant partner university. All student dismissals shall be made through a consultative process between the institutions.

(3) Dismissed students with Turkish citizenship may be placed into a program where the medium of instruction is Turkish by OSYM, depending on their YKS score achieved in the relevant year.

(4) Failed courses will be repeated at the institution where the course is offered.

ARTICLE 17 – Diploma

(1) The students who fulfill the academic requirements of both institutions shall be granted two independent double diplomas, one of which shall be issued by ITU, and the other shall be issued by IUS.

(2) The students cannot qualify for any of the diplomas without successfully fulfilling the academic requirements of both institutions in the joint program.

(3) All joint program students must satisfy both degree requirements at IUS and ITU in order to be jointly and simultaneously awarded their two diplomas from the respective universities. Upon completion of the stated requirements, students cannot be awarded only one of the two diplomas in this joint program.

(4) The degree designations which will appear on the diplomas are defined as follows: "Bachelor of Science in Mechanical Engineering" from ITU and a "Bachelor of Science in Mechanical Engineering" from IUS.

  (a) The institutions will certify to one another the name, addresses, and student identification number of each student satisfactorily completing the joint program.

  (b) The institutions will confer their B.S. Degree, together with all rights and privileges pertaining thereto, to each student meeting the respective degree course requirements for the joint program as specified in the **APPENDIX 1** attached hereto.

(5) Diploma samples are shown in **APPENDIX 1**.

(6) The phrases which will appear on the diplomas are defined as follows:

On the ITU diploma: *"having satisfactorily completed all the requirements of the Mechanical Engineering undergraduate program carried out jointly by the*

Faculty of Mechanical Engineering and the International University of Sarajevo has been awarded the degree of Bachelor of Science with all the rights, privileges and honors thereto appertaining."

On the IUS diploma: *"having satisfactorily completed the required four years of theoretical and practical study (minimum 240 ECTS) of the study program of Mechanical Engineering carried out jointly by the International University of Sarajevo and Istanbul Technical University, has on this (date) been awarded the Degree of Bachelor of Science in Mechanical Engineering with all privileges connected thereunto"*

SECTION 5
PROGRAM PROCEDURES

ARTICLE 18 – Curriculum

(1) The curriculum of the joint program, the definitions and the credits of the activities constituting the program, such as courses, laboratories, implementations, internships and thesis, and the division of the curriculum between ITU and IUS appear in **APPENDIX 2**.

(2) The joint program comprises 240 ECTS in compliance with Turkish Higher Education Qualifications Framework and Baseline of the Qualifications Framework in Bosnia and Herzegovina.

(3) Involved departments at each institution will review and approve all core curriculum course offerings in the joint program to ensure that the courses taught at each institution are comparable in content and structure. The course review may include, but is not limited to: (a) the overall course composition, (b) the content and related description for each course which is part of the joint program, (c) texts and other teaching materials appropriate to each course, and (d) qualifications of instructors. The institutions will continue to interact and provide this same review or modification on an annual basis.

(4) For the approval of this Protocol by competent bodies inTurkey and Bosnia and Herzegovina, involved departments will upon request officially send to each other the list of academic staff responsible for their part of curricula along with official CV's and decisions on holding academic promotions (including scientific field/courses).

ARTICLE 19 – Grading Systems

(1) Requirements for academic success in each course and the general academic achievement of the student shall be determined in accordance with the regulations of the institution of current study.

(2) The transcript of the student will be sent to partner institution at the end of each academic year.

(3) The grading system of ITU appears in **APPENDIX 3**.

(4) The grading system of IUS appears in **APPENDIX 4.**

ARTICLE 20 – Student Transition Requirements between Partner Institutions

(1) After successful completion of two (2) years' (four-semesters) of study at IUS, with good academic, behavioral and financial standing, students will be permitted to transfer their course grades between the institutions for satisfaction of the B.S. Degree requirements at each institution, provided the following requirements are met:

   (a) In order for a Student to transfer between the institutions (from IUS to ITU), a minimum cumulative GPA of 2.5 on a 4.0 scale or greater will be required.

   (b) Students will go through each institution's transition processes and therefore must meet all applicable requirements and deadlines pertaining to application for admission, orientation and registration, and payment of tuition and fees.

   (c) Students will abide by all applicable policies and procedures in effect at the institution they are attending.

ARTICLE 21 – Leave of Absence

(1) The joint program students may be granted a leave of absence for a semester or an academic year on condition that he has documented force majeure and/or medical reasons and submits the relevant documents as required by the respective institution that he/she is attending.

(2) The duration of the approved leave of absence shall not be counted towards the maximum duration of study.

(3) The total duration of the leave of absence cannot exceed 50 percent of the legally designated period of education or the period permitted by the applicable regulations of the respective institution.

ARTICLE 22 – Disciplinary Action

(1) Provisions applicable at the university of current study are applied in handling the disciplinary act and behaviors of students.

(2) Each institution shall be solely responsible for student conduct and discipline

matters relating to its academic operations, including grade appeals, allegations of cheating, plagiarism or classroom rules.

ARTICLE 23 – Transfer Out of the Program

(1) ITU students may apply for a transfer to the same university in the joint program or another joint program conducted in the same field in another university in accordance with the provisions concerning "Transfer between Associate Degree and Bachelor's Degree Programs, Double Major and Minor Programs and Course Credit Transfers between Institutions of Higher Education" published in the Official Gazette dated 24.04.2010 and numbered 27561.

(2) Transfers by ITU students from the joint program to another program within the country can be made in accordance with the provisions of the regulations set by the first item of this Article.

(3) Transfers by IUS students from the joint program to another program within Bosnia and Herzegovina or from the program within the country to an international program can be made in accordance with the provisions of the regulations set by the IUS transfer procedure, upon communication with ITU.

SECTION 6
MISCELLANEOUS AND FINAL PROVISIONS

ARTICLE 24 – Additional Provisions

(1) Any issue not expressly specified in this Protocol shall be subject to the provisions stated in Article 3.

(2) Use of Names: Subject to IUS's prior approval, ITU will be authorized to use IUS's name and logo on a non-exclusive basis in conjunction with ITU joint program brochures, publications, advertisements, letterhead, and material, which make reference to this Protocol. Subject to ITU's prior approval, IUS will be authorized to use ITU's name and logo on a non-exclusive basis in conjunction with IUS's joint program brochures, publications, advertisements, letterhead, and material, which make reference to this Protocol. Each institution agrees to follow any reasonable trademark usage and/or branding guidelines provided by the other institution in connection with its exercise of this license.

(3) Annual Visits: IUS and ITU agree that an annual visit by a representative from each institution to the other institution would be beneficial, although it is not a required part of this Protocol. Senior officials/faculty members on such visits will be received with local hospitality.

(4) Notices: Any notices relating to this Protocol should be in writing (which includes

facsimile or e-mail) and shall be sent to the recipient's address set forth above (or at such other addresses as may be stated in notices similarly given) and directed to the Rector and Vice-Rector of IUS and the Rector and Vice-Rector of ITU, and/or such other representatives as designated in writing by the institutions.

ARTICLE 25 – Term and Enforcement

(1) This Protocol shall be effective for five (5) years starting from the date of the approvals by the official authorities.The protocol may be renewed for successive five (5) year periods upon mutual agreement approved by YÖK.

ARTICLE 26 – Termination

(1) Either institution may terminate this Protocol early upon giving written notice thereof to the other institution at least ninety (90) days before the end of any semester. Such early termination notice shall be effective for the upcoming semester and without further liability or obligation to the other institution. Any provision of this Protocol that by its nature is intended to survive termination and/or expiration of this Protocol, shall survive termination and/or expiration of this Protocol.

(2) In the event that this Protocol expires and/or is terminated early, the institutions commit that they shall formulate a "teach-out" plan applicable to all then enrolled students who are at any stage of the joint program, including permitting such affected students to pursue alternative transfer options or course completion methods to the extent permitted under the Protocol established herein. The institutions agree that any early termination shall be made through a consultative process and that all affected students shall be notified of the same as soon as possible along with all available alternative options.

(3) This Protocol will be terminated upon official change of non-profitable nature of IUS operation as defined in the Article 1 item (3) of this Protocol.

ARTICLE 27 – Dispute Resolution

(1) Any dispute arising out of the interpretation, amendment, performance or breach of this Protocol shall be settled amicably through negotiations between the partner institutions.

ARTICLE 28 – Confidentiality

(1) Confidential Information: Both institutions will keep confidential all information provided by the other institution which is marked, identified and/or reasonably understood as confidential at the time of disclosure other than to the extent disclosure is required to perform this Protocol or required by law or legal process

to be disclosed.

(2) Student Records: Both institutions recognize that IUS is bound to comply with the Law on Higher Education in Canton Sarajevo and the Statute of IUS approved by Ministry of Education, Science and Youth of Canton Sarajevo, as it may be amended from time to time, in the handling of educational records of students enrolled at IUS. The institutions' transmittal of all student records shall be in accordance with local privacy laws and if required, the home institution will obtain written student consents and/or releases for the same. All student records will be used by the institutions for registration, admission and academic purposes only.

ARTICLE 29 – Student Residence permit

(1) Once admitted into the joint program, students will be considered enrolled at the institution which they are physically attending and considered as non-enrolled but maintaining registration at the institution in which they are not physically attending. Students from IUS will apply for Bosnian student residence permits by the start of their Freshman/1st Academic year for study (which might include language preparatory program) all until the completion of their Sophomore/2nd Academic year. During the ITU students' Junior/3rd Academic year and Senior/4th Academic year, ITU will provide confirmation of all students' enrollment and physical presence at ITU at the start of each academic year therein. IUS makes no promise, representation of guarantee of students obtaining the necessary residence permit for study in the Bosnia and Herzegovina. Students holding Bosnian citizenship must obtain Turkish student residence permit. ITU makes no promise, representation of guarantee of students obtaining the necessary residence permit for study in Turkey.

ARTICLE 30 - Quality Assurance and Inspection by YOK

(1) ITU will continually monitor the quality of the program and conduct audits and quality reviews at least once a year.

(2) After this protocol becomes effective, both institutions agree to be audited by YÖK at any given date.

This Protocol has been signed by the authorized representatives of the institutions on the dates set forth below in four copies in Turkish and English, all texts being equally authentic. In case of any divergence of interpretation, the English text shall prevail. ITU and IUS expressly consent and agree that electronic or scanned signatures appearing on this Protocol shall be treated for purposes of validity, enforceability as well as admissibility, the same as hand-written signatures.

This Protocol provides to timely submit applications to YOK (by ITU) and Ministry of Science, Education and Youth of the Canton Sarajevo (by IUS) where it becomes effective upon final approval issued by competent bodies in both countries.

AGREED AND ACCEPTED:

For IUS:
International University of Sarajevo

For ITU:
Istanbul Technical University

Prof. Dr. Ahmet Yıldırım
Rector

Prof. Dr. Mehmet Karaca
Rector

Dated:

Dated:

APPENDICES:

APPENDIX 1 – Diploma samples concerning the Joint Program

APPENDIX 2 – Curriculum of the Joint Program

APPENDIX 3 – The grading system of ITU

APPENDIX 4 – The grading system of IUS

APPENDIX 1 – Diploma Samples Concerning the Joint Program
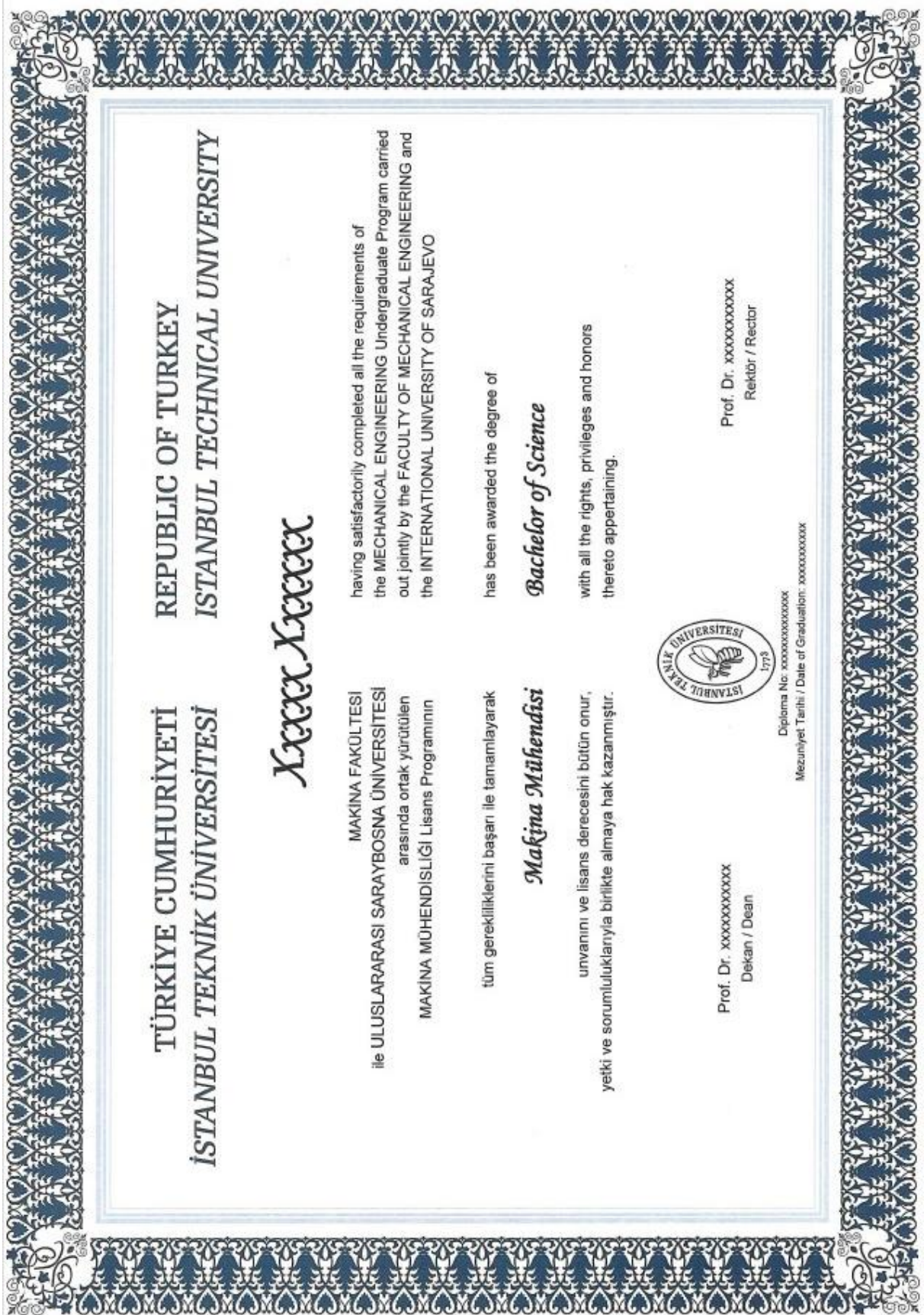
BOSNA I HERCEGOVINA
INTERNACIONALNI UNIVERZITET U SARAJEVU
SARAJEVO

FAKULTET PRIRODNIH I TEHNIČKIH NAUKA

Name (Fathers name) Surname,

Diploma

o stečenoj akademskoj tituli i stručnom zvanju

BAKALAUREAT/BACHELOR INŽINJER MAŠINSTVA

rođen ------(datum) godine u ------(mjesto), ------(država), završio je ------ godine prvi ciklus studija u trajanju od četiri (4) godine/osam (8) semestara i ostvario minimalno 240 ECTS bodova na studijskom programu Mašinstva, koji je zajednički realiziran od Internacionalnog univerziteta u Sarajevu i Tehničkog univerziteta u Istanbulu, i na osnovu toga se izdaje

Sarajevo, ------- (date)
Broj: --------

DEAN
DEKAN

Prof. Dr. ---------------

BOSNIA AND HERZEGOVINA
INTERNATIONAL UNIVERSITY OF SARAJEVO
SARAJEVO

FACULTY OF ENGINEERING AND NATURAL SCIENCES

The Degree

of

BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

With all the privileges connected thereunto

born on -------- (date) in --------- (place), of -------- (country) having satisfactorily completed the required four years of theoretical and practical study (minimum 240 ECTS) of the study program of Mechanical Engineering carried out jointly by the International University of Sarajevo and Istanbul Technical University, has on this --th day of ------ (month and year) been awarded

Date: --------
Number: -------

RECTOR
REKTOR

Prof. Dr. ---------------

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Semester 1

Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
NS104	General Chemistry		3	1	1	6
MATH101	Calculus I		3	2	0	6
NS102	Physics I		3	1	2	6
ELIT100	Academic English and Effective Communication		3	0	0	6
ENS221	Introduction to Engineering		3	0	0	3
ENS101	Introduction to Machine Design		2	0	1	3
		Semester Total =				30

Semester 2

Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
MATH102	Calculus II	MATH101	3	2	0	6
NS105	Physics II	NS102	3	1	2	6
ENS209	Statics	MATH101	3	2	0	3
ENS213 / CS103	Programming for Engineers / Introduction to programming		3	2	0	6
MATH201	Linear Algebra	MATH101	3	2	0	6
ENS207	Engineering Graphics		1	2	0	3
		Semester Total =				30

Semester 3

Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
ME208	Dynamics	NS102	3	2	0	3
ENS202	Thermodynamics I	NS102	3	2	0	6
ENS205	Materials Science	NS104	3	0	1	3
MATH202	Differential Equations	MATH101	3	2	0	6
ENS208	Introduction to Manufacturing Systems	ENS101	3	0	2	3
ME210	Strength of Materials I	ENS209	3	2	0	3
MATH203	Introduction to Probability and Statistics	MATH101	3	2	0	6
		Semester Total =				30

Semester 4

Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
MATH205	Numerical Analysis	MATH202	3	2	0	6
ENS204	Thermodynamics II	ENS202	3	2	0	6
ENS203	Electrical Circuits I	NS105	3	2	0	6
ME304	Fluid Mechanics I	MATH202	3	2	0	6
ME211	Strength of Materials II	ME210	3	2	0	3
ME206	Engineering Materials	ENS205	3	0	0	3
		Semester Total =				30

Semester 5

Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
MAK 229E	Fluid Mechanics II	ME304	2	1	0	4.0
MAK 313E	Heat Transfer	MATH101, NS102, ME304	3	1	0	5.5
MAK 339E	Machine Design I	ENS207, ENS205, ME211	2	3	0	5.5
MAK 333E	System Dynamics and Control	MATH202	3	1	0	5.5
MAK 353E	Manufacturing	ME206	3	1	0	5.0

Semester 6

Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
MAK 342E	Machine Design II	MAK 339E	2	2	0	4.5
MAK 324E	Theory of Machines	MATH201, ME208	2	1	0	4.0
MAK 312E	Measurement Systems	ENS202, ME210, ME304	2	0	2	4.5
EKO 201E	Economics		3	0	0	4.0
DAN 301E	Career Advising		0	2	0	1.0

Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
	Processes					
MAK 315E	Mechanical Vibrations	MATH201, MATH202, ME208	2	1	0	4.0
			Semester Total =			29.5

Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
	6th Sem Elective Course I (BS*)		2	1	0	4.0
	6th Sem Elective Course II (BS*)		2	1	0	4.0
	Thermal Design Elective (ED*)		2	1	0	4.5
			Semester Total =			30.5

Semester 7						
Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
ATA 101E	History of Turkish Revolution I		2	0	0	2.0
MAK 404E	Mechanical Engineering Lab	MAK 312E	1	0	3	5.0
MAK 4901E	Mechanical Engineering Design I	MAK 313E, MAK 333E, MAK 342E, MAK 324E	1	4	0	7.0
MAK 405E	Innovative Design Methods in Mech. Eng.	MAK 342E	1	2	0	3.0
TUR 101	Turkish I		2	0	0	2.0
	7th Sem Elective Course I(ED*)		2	1	0	4.0
	7th Sem.Elective Course II (ED*)		2	1	0	4.0
	7.th Sem. Elective Course(HSS*)		3	0	0	4.0
			Semester Total =			31.0

Semester 8						
Code	Title	Prerequisites	Lec	Tut	Lab	ECTS
ATA 102E	History of Turkish Revolution II		2	0	0	2.0
MAK 4902E	Mechanical Engineering Design II	MAK 4901E	1	8	0	9.0
TUR 102	Turkish II		2	0	0	2.0
	8th Sem.Elective Course I (ED*)		2	1	0	4.0
	8th Sem Elective Course II(ED*)		2	1	0	4.0
	8th Sem Elective Course III(ED*)		2	1	0	4.0
	8th Sem Elective Course (HSS*)		3	0	0	4.0
			Semester Total =			29.0

*(BS): Basic Science   (ED): Engineering Design   (HSS): Humanities and Social Sciences

6th Semester Elective Course I (BS)

Course Code	Course Title	Lec	Tut	Lab	ECTS
MAK 314E	Biomaterials ve Biomechanics	2	1	0	4
MAK 378E	Intr.to Nanotech.& Nanosyst.	2	1	0	4

6th Semester Elective Course II (BS)

Course Code	Course Title	Lec	Tut	Lab	ECTS
MAK 372E	Introduction to Finite Element Methods	2	1	0	4
MAK 376E	Computational Fluid Dynamics	2	1	0	4

Thermal Design Elective Course (ED)

Course Code	Course Title	Lec	Tut	Lab	ECTS
MAK 380E	Heat and Mass Exchanger Design	2	1	0	4.5
MAK 390E	Applied Heat Transfer	2	1	0	4.5
MAK 4040E	Steam Boiler Design	2	1	0	4.5

7th and 8th Semester Elective Courses (ED)
(*Not all of these courses are offered every semester. Some of them are offered at autumn and some at spring.*)

Course Code	Course Title	Lec	Tut	Lab	ECTS
MAK 4001E	Heat and Mass Transfer in Mini and Micro Scale Systems	2	1	0	4
MAK 4002E	Advanced Strength of Materials	2	1	0	4
MAK 4003E	Introduction to Biomechanics and Bioengineering	2	1	0	4
MAK 4004E	Introduction to Mechanics of Composite Materials	2	1	0	4
MAK 4005E	Mechanical Modeling in Nanoscale Systems	2	1	0	4
MAK 4006E	Alternative Fuels for IC Engines	2	1	0	4
MAK 4007E	Microsystem -MEMS Design	2	1	0	4
MAK 4008E	Driver Assistance Systems	2	1	0	4
MAK 4009E	Electric and Hybrid Electric Vehicles	2	1	0	4
MAK 4011E	Dynamics and Controls of Micro/Nano Scale Systems	2	1	0	4
MAK 4015E	Materials Selection in Design and Manufacturing	2	1	0	4
MAK 4016E	Hydraulic Machinery	2	1	0	4
MAK 4017E	Industrial Acoustics and Noise	2	1	0	4
MAK 4018E	Quality Control in Manufacturing	2	1	0	4
MAK 4019E	Plastics Engineering and Manufacturing	2	1	0	4
MAK 4020E	Agricultural Machinery	2	1	0	4
MAK 4021E	Machine Tools	2	1	0	4
MAK 4022E	Microprocessors and Applications in Engineering	2	1	0	4
MAK 4023E	Materials Handling	2	1	0	4
MAK 4025E	Engineering Design and CAD	2	1	0	4
MAK 4026E	Pumping Systems	2	1	0	4
MAK 4027E	Turbomachinery	2	1	0	4
MAK 4029E	Advanced Fluid Mechanics	2	1	0	4
MAK 4030E	Advanced Topics in Mechanical Design	2	1	0	4
MAK 4031E	Mass Transfer	2	1	0	4
MAK 4032E	Metal Forming	2	1	0	4
MAK 4033E	Gas Dynamics	2	1	0	4
MAK 4035E	Hydraulic and Pneumatic Circuits	2	1	0	4
MAK 4036E	Manufacturing Engineering and CAM	2	1	0	4
MAK 4037E	Computer Controllded System Design	2	1	0	4
MAK 4038E	Power Plants	2	1	0	4
MAK 4039E	HVAC Fundamentals	2	1	0	4
MAK 4041E	Mechanical Installation for Buildings	2	1	0	4
MAK 4042E	Gas Turbines	2	1	0	4

Course Code	Course Title				
MAK 4043E	Fire Dynamics and Protection	2	1	0	4
MAK 4044E	Energy Management	2	1	0	4
MAK 4045E	Vehicle System Dynamics and Control	2	1	0	4

7th and 8th Semester Elective Courses (ED) (continued)
(*Not all of these courses are offered every semester. Some of them are offered at autumn and some at spring.*)

Course Code	Course Title	Lec	Tut	Lab	ECTS
MAK 4047E	Dynamic Systems Modelling and Simulation	2	1	0	4
MAK 4048E	HVAC Systems and Equipment Design	2	1	0	4
MAK 4049E	Control Elements and Applications	2	1	0	4
MAK 4050E	Optimization of Thermal Systems	2	1	0	4
MAK 4051E	Noise and Vibration in Vehicles	2	1	0	4
MAK 4052E	Building Automation	2	1	0	4
MAK 4053E	Vehicle Technology	2	1	0	4
MAK 4054E	Digital Control System Design	2	1	0	4
MAK 4055E	Fuel Economy in Road Vehicles	2	1	0	4
MAK 4056E	Control Systems Design	2	1	0	4
MAK 4057E	Vehicle Systems Design	2	1	0	4
MAK 4058E	Power Transmission in Vehicles	2	1	0	4
MAK 4059E	Precision Machine Design	2	1	0	4
MAK 4060E	Vibration Analysis by Finite Element Methods	2	1	0	4
MAK 4061E	Exhaust Gas Emmision	2	1	0	4
MAK 4062E	Railway Vehicles	2	1	0	4
MAK 4063E	Design of Internal Combustion Engines	2	1	0	4
MAK 4065E	Refrigeration	2	1	0	4
MAK 4066E	Vehicle Chassis and Body Design	2	1	0	4
MAK 4067E	Renewable Energy Systems	2	1	0	4
MAK 4068E	Fluid Power Control	2	1	0	4
MAK 4069E	Thermal Environmental Engineering	2	1	0	4
MAK 4070E	Internal Combustion Engines	2	1	0	4
MAK 4071E	Introduction to Robotics	2	1	0	4
MAK 4078E	Fundamentals of Mechanical Design	2	1	0	4
MAK 4079E	Thermodynamics of Biomolecular Systems	2	1	0	4

7th Semester Elective Courses (HSS)
(*Note: Not all but some of these courses are offered every autumn semester.*)

Course Code	Course Title	Lec	Tut	Lab	ECTS
SNT 101E	Looking at the Art of Sculpture	3	0	0	4
SNT 102E	Photography	3	0	0	4
SNT 103E	Drawing	3	0	0	4
SNT 104E	Mythology and Art	3	0	0	4
SNT 105E	Film Art	3	0	0	4
SNT 106E	Traditional Turkish Art&Crafts	3	0	0	4
SNT 107E	Ancient Civilizations in Anatolia	3	0	0	4

Course Code	Course Title	Lec	Tut	Lab	ECTS
SNT 108E	Ceramic	3	0	0	4
SNT 109E	Gravure	3	0	0	4
SNT 111E	Fashion Design and Art	3	0	0	4
SNT 112E	Theater	3	0	0	4
SNT 113E	Art and Interpretation	3	0	0	4
SNT 114E	Contemporary Art	3	0	0	4
SNT 115E	Modernity and Visual Culture	3	0	0	4
SNT 116E	The Art of Communication	3	0	0	4
SNT 117E	Jazz Appreciation	3	0	0	4
SNT 118E	Archaeology of Music	3	0	0	4
SNT 119E	History of Popular Music	3	0	0	4
SNT 121E	World Music Cultures	3	0	0	4
SNT 122E	Ceramic Art	3	0	0	4
SNT 123E	Film Making	3	0	0	4
SNT 123E	Film Production	3	0	0	4
SNT 211E	Istanbul:History ,Art and Society	3	0	0	4
SNT 212E	Art,Culture and Society	3	0	0	4
SNT 213E	Music Cultures of Turkey	3	0	0	4
SNT 214E	Performance, Music and Dance	3	0	0	4
SNT 215E	Balkan Musics	3	0	0	4
SNT 226E	Philosophy of Art	3	0	0	4
SNT 227E	Sound and Society	3	0	0	4
SNT 228E	Music and Politics	3	0	0	4

8th Semester Elective Courses (HSS)
(*Note: Not all but some of these courses are offered every spring semester.*)

Course Code	Course Title	Lec	Tut	Lab	ECTS
BEB 120E	Sports and Sciences	3	0	0	4
BEB 121E	Sports and Technology	3	0	0	4
HUK 201E	Labor Law	3	0	0	4
HUK 211E	Social Security Law	3	0	0	4
HUK 212E	Syndicate and Collective Bargaining Law	3	0	0	4
HUK 213E	Occupational Safety and Health Law	3	0	0	4
HUK 214E	Protection of Technological Innovations	3	0	0	4
ING 103A	Creative Writing	3	0	0	4
ING 103AC	Urban Ecology	3	0	0	4
ING 103AD	Advanced English for Engineers	3	0	0	4
ING 103B	Business English	3	0	0	4
ING 103C	Great Moments in Science	3	0	0	4
ING 103ES	Intercultural Citizenship in International Education	3	0	0	4
ING 103G	Business Communications	3	0	0	4
ING 103H	Public Presentations	3	0	0	4
ING 103I	Short Stories	3	0	0	4
ING 103L	Mythology	3	0	0	4
ING 103N	Film Studies	3	0	0	4
ING 103O	Psychology	3	0	0	4

Course Code	Course Title	Lec	Tut	Lab	ECTS
ING 103P	Poetry	3	0	0	4
ING 103SC	Science Communication: Theory and Practice for Engineers	3	0	0	4
ISL 465E	Introduction to Entrepreneurship and Innovation	3	0	0	4
ISL 478E	Entrepreneurship	3	0	0	4
ITB 020E	Formations of Modernity	3	0	0	4
ITB 037E	Knowledge, Language and Logic	3	0	0	4
ITB 087E	Media and Society	3	0	0	4
ITB 094E	International Relations&Globalization	3	0	0	4
ITB 095E	Technology, Policy and Law	3	0	0	4
ITB 143E	Durell and Said: Orientalism Practice and Theory	3	0	0	4
ITB 151E	Human Resources and Management	3	0	0	4
ITB 171E	Science, Technology & Society	3	0	0	4
ITB 179E	Literatures of Intimate Separacies: Vizyenos,Seyfettin,Armen	3	0	0	4
ITB 201E	Introduction to Humanities & Social Sciences	3	0	0	4
ITB 202E	World History	3	0	0	4
ITB 203E	Sociology	3	0	0	4
ITB 204E	Political Science	3	0	0	4
ITB 205E	Philosophy	3	0	0	4
ITB 206E	Issues in World Politics	3	0	0	4

8th Semester Elective Courses (HSS)

(*Note: Not all but some of these courses are offered every spring semester.*)

Course Code	Course Title	Lec	Tut	Lab	ECTS
ITB 207E	Ottoman History	3	0	0	4
ITB 208E	Formations of Modern Turkey	3	0	0	4
ITB 209E	Turkey in World Affairs	3	0	0	4
ITB 211E	Istanbul:History,Art and Society	3	0	0	4
ITB 212E	Art,Culture and Society	3	0	0	4
ITB 213E	Topics in Literature and Society	3	0	0	4
ITB 215E	Topics in History and Society	3	0	0	4
ITB 216E	Economy and Society	3	0	0	4
ITB 217E	Engineering Ethics	3	0	0	4
ITB 218E	History of Science and Technology	3	0	0	4
ITB 219E	Ethics	3	0	0	4
ITB 220E	Psychology	3	0	0	4
ITB 221E	Anatolian Archaeology	3	0	0	4
ITB 222E	City and Society	3	0	0	4
ITB 224E	Environment and Society	3	0	0	4
ITB 226E	Philosophy of Art	3	0	0	4
ITB 227E	Political Theory	3	0	0	4
ITB 228E	Gender Studies	3	0	0	4
ITB 230E	Disaster Awareness	3	0	0	4
ITB 233E	Anthropology	3	0	0	4
ITB 234E	The Rise of Civilizations	3	0	0	4

International Undergraduate Joint Program in Mechanical Engineering between Istanbul Technical University, Turkey and International University Of Sarajevo, Bosnia And Herzegovina

COURSE DESCRIPTIONS

Compulsory Courses at IUS

ELIT100 Academic English and Effective Communication   ECTS 6 (3+0+0)
The course designed to teach the organizational and critical thinking skills necessary for logical written expression. The course focuses on writing a research paper of at least 3000 words based on sound scholarly sources on a topic of interest related to a student's field by conforming to the APA standards of writing without committing plagiarism. In this course the whole research process is taught step by step through skills including research, source selection, choice of topic, construction and defense of a thesis statement, citing sources, outlining, organizing a "References" page and note taking. Critical elements of the course are instruction in paraphrasing and summarizing techniques, use of quotations and the incorporation of these research findings in the paper together with the inclusion of personal comments, avoidance of plagiarism and conforming to ethical rules.

ENS101 Introduction to Machine Design   ECTS 3 (2+0+1)
The course provides a comprehensive guide for the student toward successful design development. Fundamentals are emphasized throughout; so, the approach described provides a sound basis for design courses that help students move quickly and effectively into design practice. For the creation and reading of engineering drawings, it teaches concepts such as perspective, projection, sectioning, tolerance, assembly with applications.

ENS202 Thermodynamics I   ECTS 6 (3+2+0)
Properties of pure substances. Ideal and real gases. Energy, heat, work. Conservation of energy. Application on systems and control volumes. Heat engine. Second law of thermodynamics. Carnot principles. Clausius inequality. Principle of the increase of entropy. Exergy, second law analysis.

ENS203 Electrical Circuits I   ECTS 6 (3+2+0)
In this course, the principles and basic technology of electrical and electronics engineering will be introduced. Examples of related engineering applications will be given. In addition, electrical machinery, power electronics, and electrical driving circuits will be introduced within the scope of mechanical engineering requirements.

ENS204 Thermodynamics II   ECTS 6 (3+2+0)
Gas, vapor and combined power cycles. Cogeneration. Refrigeration cycles. Gas mixtures. Gas-vapor mixtures and air-conditioning. Chemical reactions. Chemical and phase equilibrium.

ENS205 Materials Science   ECTS 3 (3+0+1)
Introduction to materials science and classification of atomic structures of the materials. Crystal structures and imperfections. Mechanical and physical properties of the engineering materials. Solid-state diffusion. Phase diagrams and solidification. Ferrous / non-ferrous alloys and heat treatment. Electrical, optical, thermal and magnetic properties associated with electron band structures of the materials. Metallic corrosion and prevention from corrosion. Principle

geomaterials, their properties and application areas. Deterioration of geomaterials.

ENS207 Engineering Graphics ECTS 3 (1+2+0)

Technical drawing in engineering. Meanings of line types. Lettering. Fundamentals of dimensioning. Principles of projection. Orthographic views. Section views. Isometric perspectives. Surface finishing symbols. Symbols of materials. Mechanical assembly drawing. Fasteners. Welding symbols. Limits and fits. Geometric tolerances.

ENS208 Introduction to Manufacturing Systems ECTS 6 (3+1+1)

Course is designed to introduce manufacturing equipment used in machining, forming, casting and welding processes and hands-on practice on various manufacturing processes and equipment. The main goals of the course are: (1) To introduce the student into the practice of project work, manual and computer technical drawing practice. (2) To get experience in planning and implementing a workshop project within a team. (3) To develop the student's creative and intellectual abilities. A contest is held at the end of the course to assess the group projects.

ENS209 Statics ECTS 3 (3+2+0)

Basic principles. Force vector. Equilibrium of particle. Moment of a couple. Equilibrium of rigid body. Planar forces. Center of gravity. Pappus-Guldinus theorem. Distributed loads and hydrostatic forces. Supports and support reactions. Gerber beam. Frames. Trusses. Friction. Virtual work.

ENS213 Programming for Engineers ECTS 6 (3+1+1)

Programming for engineers. Introduction to scientific and engineering computing. Introduction to program computing environment. Variables. Operations and simple plot. Algorithms and logic operators. Flow control. Errors and source of errors. Functions. Linear algebra applications. Solving equations applications. Polynomials examples. Curve fitting applications. Interpolation applications. Numerical integration applications. Symbolic mathematics. Ode solutions with built-in functions.

ENS221 Introduction to Engineering ECTS 3 (3+0+0)

Introduction of the Engineering Programs and the regulations. Engineering profession and the place of engineering in fields. Development of engineering. Engineering ethics. Contribution of engineering to the solution of societal problems. Principal application areas of engineering.

MATH101 Calculus I ECTS 6 (3+2+0)

Functions of a single variable. Limits and continuity. Derivatives. Applications of derivatives. Sketching graphs of functions. Asymptotes. Integration. Fundamental theorem of calculus. Applications of integrals. Polar coordinates. Transcendental functions. Techniques of integration. Indeterminate forms. L'Hopital's rule.

MATH102 Calculus II ECTS 6 (3+2+0)

Improper integrals. Infinite sequences and series. Vectors in space. Vector-valued functions. Multivariable functions and partial derivatives. Multiple integrals. Integration on vector fields.

MATH201 Linear Algebra ECTS 6 (3+2+0)

Matrices and system of equations. Systems of linear equations. Row echelon form. Matrix algebra. Elementary matrices. Determinants. The determinant of a matrix. Properties of determinants. Cramer's rule. Vector spaces. Definition of vector space. Subspaces. Linear independence. Basis and dimension. Change of basis. Row space end column space. Linear transformations. Matrix representations of linear transformations. Orthogonality. The scalar product. Orthogonal subspaces. Inner product spaces. Orthonormal sets. Gram-schmidt

orthogonalization. Eigenvalues and eigen vectors. Diagonalization.

MATH202 Differential Equations   **ECTS 6 (3+2+0)**
First order differential equations. Second order linear equations. Higher order linear equations. Series solutions of second order linear equations. The laplace transform. Systems of first order linear equations.

MATH203 Introduction to Probability and Statistics   **ECTS 6 (3+2+0)**
Product rule. Permutation. Combination. Concept of probability (kolmogorov axioms). Conditional probability and independency. Random variables. Probability density function. Distribution function. Discrete distributions: Bernoulli, Binomial ve Poisson. Continuous distributions: normal, Gamma, exponential. Expectation. Moment generating function. Mean, variance and standart deviation. Covariance. Correlation. Chebchev's inequality. Estimator and its properties. Maximum likelihood estimators. Confidence intervals. Hypothesis testing. One and two sample test for means. Regression.

MATH205 Numerical Analysis   **ECTS 6 (3+2+0)**
Description of numerical methods and applications of them particularly in engineering. Error analyses in numerical methods. Analytical solutions. Numerical methods for the solution of systems (linear and nonlinear). Approximation methods. Interpolation. Linear regression. Numerical integration.

ME206 Engineering Materials   **ECTS 3 (3+0+0)**
Classification of engineering materials. Iron and steel production. Types and use of steel and cast iron. Heat treatment of metals and alloys. Non-ferrous metals and alloys and their use in engineering applications. Types, properties, principal uses and manufacturing techniques of ceramics, polymers and composite materials. Failure of materials. Non-destructive testing of materials. Materials selection in engineering design.

ME208 Dynamics   **ECTS 3 (3+2+0)**
Kinematics of particles; velocity and acceleration in rectangular, cylindrical, spherical and normal and tangential coordinates. Rectilinear motion. Relative motion. Kinetics of particles; Newtons law of motion. Equation of motion. Work. Impulse. Momentum. Principle of work and energy, principle of impulse and momentum. Angular momentum, angular impulse and momentum principle. Kinetics of systems of particles. Planar kinematics of rigid bodies, instantaneous center of rotation. Planar kinetics of rigid bodies. Three-dimensional kinematics of rigid bodies. Three-dimensional kinetics of rigid bodies.

ME210 Strength of Materials I   **ECTS 3 (3+2+0)**
Basic concepts of solid mechanics. Mechanical properties of materials. Axial loading. Shear stresses and shear loading. Bending. Deflection of beams.

ME211 Strength of Materials II   **ECTS 3 (3+2+0)**
Torsion. Buckling of columns. States of stress and strain. Criteria for failure. Combined loading. Fatigue.

ME304 Fluid Mechanics I   **ECTS 6 (3+2+0)**
Basic concepts and definitions. Fluid kinematics. Fluid statics. Manometers and pressure measurements. Hydrostatic forces on immersed bodies. Solid body translation and rotation. Integral equations of conservation of mass, momentum and energy for systems and control volumes. Reynolds transport theorem. Bernoulli equation and its applications. Continuity.

Derivation of conservation equations in differential form. Navier-Stokes equations and their applications. Stream function and flow potential. Dimensional analysis and similarity.

NS102 Physics I   **ECTS 6 (3+1+2)**
Vectors. Motion in one and two dimensions. Newton's laws and its applications. Work and energy. Conservation of mechanical energy. Momentum and motion of systems. Static equilibrium of rigid bodies. Rotation and angular momentum. Newton's law universal gravitation.

NS104 General Chemistry   **ECTS 6 (3+1+1)**
The scope of chemistry and stoichiometry. Atoms and the atomic theories. The periodic table and some atomic properties. Chemical bonding. Molecular geometry. Gases and gas laws. Liquids. Solids. Solutions and their physical properties. Thermochemistry. Principles of chemical equilibrium. Acids and bases. Thermodynamics.

NS105 Physics II   **ECTS 6 (3+1+2)**
Coulomb's law and electrical field. Gauss's law. Electrical potential. Capacitance. Electrostatic energy and properties of insulators. Current and resistance. DC circuits. The magnetic field. Sources of magnetic field. Faraday's law. Inductance. Magnetic field in the matter. Electromagnetic oscillations and AC circuits. Maxwells equations and electromagnetic waves.

Compulsory Courses at ITU

ATA 101E History of Turkish Revolution I   **ECTS 2.0 (2+0+0)**
A definition of Revolution/Renovation. The aim and the importance of the Turkish history of renovation. The reason for the decline. Efforts to save the Ottoman Empire. Intellectual currents. The First World War. Mustafa Kemal in Anatolia and the Congresses. The opening of the Great Turkish National Assembly. Independence war. National and international policy. The Mudanya treaty. Lousanne conference.

ATA 102E History of Turkish Revolution II   **ECTS 2.0 (2+0+0)**
The declaration of the Republic and politic, social and cultural revolutions and economic breakthroughs. Constitutional solutions to the problems related to the Lausanne Conference. Reactions to the new governmental structure. Atatürk s foreign policy to inspire confidence in the future of Turkey. Trials in and transition to the multi-party system. Democratic Party and post period. Kemalism, the Principles of Atatürk

DAN 301 Career Advising   **ECTS 1.0 (0+2+0)**
This course is designed to improve students' awareness of their interests, skills, values and preferences and to help them shape and develop future-oriented academic and/or industrial career goals and career plans.

EKO 201E Economics   **ECTS 4.0 (3+0+0)**
Introduction to the principles of micro and macroeconomics. The fundamental problems of economies. The modeling of household and firm behaviors. Market structures. The principles of public finance. The modeling of macroeconomics in an international context

MAK 229E Fluid Mechanics II   **ECTS 4.0 (2+1+0)**
Viscous Flow in pipes and ducts. Laminar and turbulent boundary layers. Major and minor losses in pipes. Flow over immersed bodies. Boundary layer equations. Potential flow. Introduction to CFD. Compressible flow. Fluid machinery. Water hammer.

MAK 312E Measurement Systems   **ECTS 4.5 (2+0+2)**
Basic concepts in measurement. Error and error analysis. Probability and statistics for uncertainty and confidence analysis of experimental data. Static calibration. Digital data acquisition. Dynamic system response. System identification. Signal conditioning. Spectrum analysis. Bridge circuits and variable impedance devices. Modulation. Noise and noise rejection. Report writing and presentation. Methods and sensors for basic analog electronics. Displacement, pressure, flow, temperature, heat, force, strain, vibration and sound measurements

MAK 313E Heat Transfer   **ECTS 5.5 (3+1+0)**
Mechanisms of heat transfer. Steady and transient heat conduction in solids, solution methods. Laminar and turbulent forced convection and natural convection. Phase change heat transfer. Heat exchangers. Radiation heat transfer.

MAK 315E Mechanical Vibrations   **ECTS 4.0 (2+1+0)**
Basics concepts. Undamped, damped and forced vibrations of single-degree-of-freedom (d.o.f) systems. Vibration measuring instruments. Vibration isolation. Vibrations of two-d.o.f systems. Dynamic vibration absorber. Free and forced vibrations of multi-d.o.f systems. Approximate methods in natural frequency calculation. Modal analysis. Whirling motion and critical speed of shafts.

MAK 324E Theory of Machines   **ECTS 4.0 (2+1+0)**
Mechanisms, kinematic diagrams, kinematic chains and mobility. Some basic mechanisms. Kinematic analysis and synthesis of mechanisms. Mechanism design methods. Review of some fundamental principles of mechanics. Static balance of machinery. Machine equation of motion and its implementation. Fundamental problems of machinery dynamics. Speed fluctuations and flywheel calculation. Calculation of joint and bearing forces in machines. Shaking forces and mass balance. Balancing of rigid rotors.

MAK 333E System Dynamics and Control   **ECTS 5.5 (3+1+0)**
Introduction to system dynamics and control. Transfer function of linear systems. Linearization. Transient response analysis. Stability analysis. Basic control algorithms and structures. PID tuning methods. Frequency response analysis. Basic controller design methods and examples.

MAK 339E Machine Design I   **ECTS 5.5 (2+3+0)**
Mechanical engineering design process and importance of machine elements knowledge in this process. Fundamentals of design and applications of machine elements. Welded, soldered, adhesive bonded, riveted joints. Shaft-hub connections. Bolted joints and power screw mechanisms. Pins, knuckles, springs, shafts and axles, coupling and clutches. Lubricants and lubrication theory. Sliding and rolling bearings.

MAK 342E Machine Design II   **ECTS 4.5 (2+2+0)**
Fundamentals of speed reduction mechanisms. Kinematics and geometry of gears. Spur, helical, bevel, spiral and worm gear mechanisms. Belt drive and chain mechanisms.

MAK 353E Manufacturing Processes   **ECTS 5.0 (3+1+0)**
Principles and classifications of processes in manufacturing. Advantages, limitations and comparisons of materials processing. Design and manufacturing, selection of process. Casting, welding, forming, machining, and powder metallurgy. Manufacturing of polymer and composites parts. Ceramic part manufacturing. Rapid prototyping.

MAK 404E Mechanical Engineering Laboratory   **ECTS 5.0 (1+0+3)**
Experiment design. System experiments on basic fields of mechanical engineering (thermal

systems, hydraulic systems, automotive systems, mechanical vibrations and Acoustics, controls, manufacturing, and strength of materials). Realizing experiments in groups. Analysis of experimental data and presentation of results in written reports.

MAK 405E Innovative Design Methods in Mechanical Engineering   ECTS 3.0 (1+2+0)
Fundamentals of engineering design. Determination of requests for design. Analysis of requests. Product idea formation. Industrial and intellectual property rights. Patents. Innovative solution search techniques. Functional synthesis or design. Selection of optimal solution. Utility value analysis.

MAK 4901E Mechanical Engineering Design I   ECTS 7.0 (1+4+0)
This course includes an appropriate design project with all the design phases starting from project selection to completion and presentation, and which leads the students use the knowledge they gained during their tenure in the department and gain complete design experience. In this course, design of a machine, system or process is conducted in the framework of an open-ended engineering problem and a team of students develops the solution. Design calculations, parametric analysis and optimization, materials selection, technical drawings and solid modelling, economic analysis are all requirements for an acceptable project.

MAK 4902E Mechanical Engineering   Design II   ECTS 9.0 (1+8+0)
This course and MAK 4901E can either be performed as two separate capstone design projects with similar methodology as described for MAK 4901E; or can be accomplished in an integrity by realizing the design from the MAK 4901E course, producing a prototype of the design, conducting performance tests and optimizing it, and obtaining a final prototype.

TUR 101 Turkish I   ECTS 2.0 (2+0+0)
Definition of language. Language and thought. Language and culture. World languages (in point of origin and structure). The significance of turkish language among world languages. The historical development of turkish language. The structure of turkish language. Turkish phonetics. Todays turkish language.the act of writing and the rules of writing (orthography). Spelling rules. The right expression of thought. Scientific language and turkish as a scientific language. Turkish poetry and poetry language.

TUR 102 Turkish II   ECTS 2.0 (2+0+0)
Written expression. Method and planning of written expression. Writing exercise. Scientific texts (article-report-critic). Official texts (petition-resume). Genres of literature. Essay. Column. Travel writing. Biography. Story. Novel. Verbal literature. Verbal expression and communication.