University of Isfahan

Course Outline
Railway Tracks Engineering
Graduate Program

Department of Railway Engineering and Transportation Planning
Faculty of Civil Engineering and Transportation
University of Isfahan

November 2023

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1. Definition and goal

Railway Tracks engineering graduate program is one of the higher education-research based programs that its goal is training skilled experts for railway industries and any academic and training centers. This program includes concerns for railways tracks design, installation and maintenance. Students will consider key aspects relating to super/sub-structure, train-track interaction, railway track inspection methods, maintenance tools, strategy and management. This program covers advances in modelling, simulation and data analysis techniques to advance the effectiveness and efficiency of kinds of railway tracks such as conventional ballasted, modern ballast-less (slab track), high speed and urban systems.

The graduates will be able to:

- Communicate with professional railway terminology independently
- Apply railway track engineering in research and development
- Contribute to railway track engineering field both locally and internationally.
- Demonstrate the ability to use suitable methods to solve practical railway issues in the field of railway track infrastructure design, construction, maintenance and management.
- Propose methods for enhancing and developing current and future railway track systems;

2. Duration of Program and the structure

The average duration of this program is 2 years. Every semester lasts 16 complete weeks of education.

3. Credits

The total number of credits in the master degree program is 32 as described in Table 1.

Table 1. Course credits of Railway Tracks Engineering Graduate Program

No.	Type of courses	Credits
1	Core courses	13
2	Optional courses	11
3	Seminar*	2
4	Thesis	6
Total		32

* All graduate students are required to undertake the “Seminar” as 2 credits of their core curriculum. The purpose of this course is to learn how to research papers in reliable literature sources, review the articles and then submit a written report of the reviewed articles and present it, verbally.

The students should investigate a specific topic under the supervision of their supervisor and, at the end of the semester, submit their research report as a thesis to the supervisor, and deliver an oral presentation for the supervisor and two faculty professors appointed as a referee.

3.1 Compensatory courses of master degree program:

The applicant of different minors in Railway engineering (railway transportation planning, Rolling stocks), as well as other majors, such as Civil and Mechanic Engineering, can continue their master degree in the Railway Tracks Engineering. Therefore, a number of courses should be successfully passed in addition to those listed in Table 1. The compensatory course credits are not count in the transcript. Table 2 shows the list of compensatory courses for graduate program in railway track engineering.

Table 2. Compensation courses of MSc program in Railway Tracks Engineering

No.	Course Title	Credits
1	Railway Track Sub-Structure	3
2	Railway Track Super-Structure I	3
3	Railway Track Super-Structure II	3
4	Railway Track Construction	3
5	Dynamic of Train Movement	3

3.2 Core and optional courses of master degree program:

The master degree program of railway tracks engineering has 4 core courses. Table 3 shows the core courses of the master degree program.

Table 4 shows the optional courses of the master degree program. All graduate students of railway tracks engineering can choose their optional courses from Table 4. Students should take 12 credits from the list of optional courses.

Table 3. Core courses of MSc program in Railway Transportation Engineering

No.	Course Title	Credits
1	Advances Engineering Mathematics	3
2	Advanced Railway Track Sub-Structure	3
3	Train & Track Interaction	3
4	Advanced Railway Design	3
5	Track laboratory	1
Total credits	13	

Table 4. Optional courses of MSc program in Railway Tracks Engineering

No.	Course Title	Credits
1	Finite Elements Method	3
2	Railway Track Tests	3
3	Railway Maintenance & Repair Management	2
4	Soft Computing Methods in Railway Engineering	3
5	Modern Methods of Track Maintenance	3
Total credits	14	

ADVANCED ENGINEERING MATHEMATICS

BASIC INFORMATION

Course prefix, title and semester: Core, Advanced Engineering Mathematics, Q1

Number of credits: 3

COURSE PREREQUISITES:

-

COURSE CO-REQUISITES:

-

TEACHERS:

Person in charge: Department of Railway Engineering and Transportation Planning
Office location:
Phone Number:
Email Address:

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
3 hrs	-	-	1 hr

COURSE OBJECTIVES

The preparation of this course has been inspired by the following objectives:

- Advanced topics in engineering and applied mathematics
- Topics in differential equations, complex numbers theory, tensors and functional analysis

REQUIRED STUDENT RESOURCES

Textbooks:

1- P. V. O'Neil, “Advanced Engineering Mathematics”, 7th edition, Cengage-Engineering; 2011.
2- D. G. Zill and W. S. Wright, “Advanced Engineering Mathematics”, 4th edition, Jones & Bartlett Pub; 2009.

References:

3- M. Greenberg, “Advanced Engineering Mathematics”, 2nd edition, Prentice Hall; 1998.
4- E. Kreyszig, “Advanced Engineering Mathematics”, 10th edition, Wiley, New York, 2011.
5- Hildebrand, FB. Methods of Applied Mathematics, Dover Publications, 1992.

Web links: -
Computer Software:

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week	Topic
1	course introduction, objectives, references, assignments; preliminary definitions; Fourier series; Euler's formula
2	Fourier series convergence theorem; periodic functions of arbitrary period; Fourier series for even and odd functions; half-range expansion; solution of differential equations with Fourier series
3	approximation with trigonometric polynomials; Gibb's phenomenon; Sturm-Liouville problems; orthogonality of functions; Fourier-Bessel and Fourier-Legendre series
4	Fourier integral; Fourier sine and cosine integral; Fourier transform; Fourier sine and cosine transforms; Fourier transform of derivatives of a function
5	complex Fourier integral; complex Fourier transform; introduction to partial differential equations; definitions for linear, non-linear, homogenous, inhomogeneous differential equations
6	wave equation; separation of variables method; D'Alembert's method; heat transfer equation; Dirichlet and Neumann problems; solution of heat transfer problems with Fourier series
7	solution of heat transfer problems with Fourier integral; solution of membrane problem (2D wave equation); 2D Fourier series
8	mid-term exam; complex numbers in Cartesian and polar coordinates; basic algebra on complex numbers; integer powers of a complex number; integer roots of a complex number
9	limits and derivatives of complex functions; analytic function; Cauchy-Riemann equations; exponential function; trigonometric functions; logarithm and general power
10	an introduction to complex integration; indefinite integration; Cauchy integral theorem; derivatives of analytic functions
11	series and sequences; convergence tests; power series; convergence of power series; functions given by power series
12	Taylor series; Maclaurin series; Taylor series convergence; functions given by Taylor series; uniform convergence
13	residue theorem; residue integration method; residue integration of real integrals; residue integration of improper integral
14	conformal mapping; properties of conformal mappings in harmonic equations; using conformal mapping in solution of partial differential equations
15	an introduction to tensor calculus; properties of tensors; indicial notation; Cartesian tensors; tensor operations
16	an introduction to functional analysis; Euler-Lagrange equation; application of functional analysis in numerical methods such as Rayligh-Ritz

EVALUATION PROCEDURES AND GRADING CRITERIA

Home works (10%), Midterm (40%), Final (50%)

ATTENDANCE STATEMENT

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APPROVED ACADEMIC HONESTY STATEMENT

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SYLLABI ON WEB PAGES

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ADVANCED RAILWAY TRACK SUB-STRUCTURE

BASIC INFORMATION

Course prefix, title and semester: Core, Advanced Railway Track Sub-Structure, Q1

Number of credits: 3

COURSE PREREQUISITES:

-

COURSE CO-REQUISITES:

-

TEACHERS:

Person in charge: Department of Railway Engineering and Transportation Planning
Office location:
Phone Number:
Email Address:

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
3 hrs.	-	-	1 hr.

COURSE OBJECTIVES

The aim of this course is to learn dynamic behavior of track ballast, sub-ballast and subgrade with static and dynamic of moving train loads, using models and finding solution methods to solve the problems.

REQUIRED STUDENT RESOURCES

Textbooks:

Indraratna, Buddhima, Wadud Salim, and Cholachat Rujikiatkamjorn. Advanced rail geo-technology-ballasted track. CRC press, 2011.

References:

1- Indraratna, Buddhima, Wadud Salim, and Cholachat Rujikiatkamjorn. Advanced rail geo-technology-ballasted track. CRC press, 2011.
2- Selig, Ernest Theodore, and John M. Waters. Track geotechnology and substructure management. Thomas Telford, 1994.
3- Indraratna, Buddhima, and Trung Ngo. Ballast railroad design: smart-uow approach. CRC Press, 2018.
4-Das, Braja M. Principles of geotechnical engineering. Cengage learning, 2021.

Web links: -

Computer Software: Sap2000, Plaxis,

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week	Topic
1	Introduction and review of railway track components
2	Railway track static and dynamic/cyclic loads
3	Advanced technical specification of ballast aggregate and layer
4	Advanced design of track ballast
5	Advanced technical specification of sub-ballast aggregate and layer
6	Advanced design of track sub-ballast(intermediate/Blanket layer)
7	Railway sub-layers behavior under cyclic and dynamic loading (tests and methods)
8	Governed factors effecting on ballast behavior under loading
9	Ballast layer defects and degradation
10	Mathematical models of track ballast layer settlement
11	Non-destructive methods and layer condition monitoring
12	Machineries and maintenance of railway track sub-structure
13	Track Drainage and its design
14	Discussion of using geo-synthetic(Geo-grids and Geotextile) in railway track
15	Strengthen methods and techniques of railway subgrade
16	Worldwide and International Standards for design and implementation of railway substructures

EVALUATION PROCEDURES AND GRADING CRITERIA

Home works (10%), Project (20%), Final (70%)

ATTENDANCE STATEMENT

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SYLLABI ON WEB PAGES

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TRAIN AND TRACK INTERACTION

BASIC INFORMATION
Course prefix, title and semester: Core, Train and Track Interaction, Q2
Number of credits: 3

COURSE PREREQUISITES:
Advanced railway Substructure Design

COURSE CO-REQUISITES:
-

TEACHERS:

Person in charge: Dr. Meysam Jahangiri
Office location: Faculty of Civil Engineering and Transportation, University of Isfahan, Hezar-Jerib av., Isfahan, Iran
Phone Number:
Email Address:

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
3 hrs.	-	-	1 hr.

COURSE OBJECTIVES
Knowledge of the methods of modeling different components of the train and track and the interaction between, as well as the methods of direct and numerical analysis of the interaction problem and extracting appropriate results.

REQUIRED STUDENT RESOURCES

Textbooks and References:

- Zhai Wanming, and Xia He, Train - track - bridge Dynamic Interaction Theory and Engineering Application,2011
- Wanming Zhai, Kaiyun Wang and Chengbiao Cai, Fundamentals of vehicle–track coupled dynamics, 2009
- Anil K. Chopra, Dynamics of Structure, University of California at Berkeley, 1995

Web links: -

Computer Software: Matlab or other engineering programming software, Microsoft Excel

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week 16	Topic
1	Introducing train and track interaction, its effective components and the purpose of interaction analysis
2	Dynamic analysis of single-degree of freedom systems (Free vibration, Harmonic excitation)
3	Dynamic analysis of multi-degree of freedom systems
4	Free vibration, Eigenvalues, Vibration modes and Modal analysis of multi-degree of freedom systems
5	Numerical solution of single and multiple degree of freedom systems
6	Different models of train and track in order to train-track interaction analysis
7	Train 2D and 3D modeling with lumped mass
8	Wheel-rail contact and its interaction model
9	Static and pseudo-dynamic analyses(Dynamic coefficients depending on the track and passing speed, Lateral Louds and . . .)
10	Dynamic modal analysis of train and track interaction
11	Using the direct integration method in the analysis of train and track interaction
12	Formation of overall mass, damping and stiffness matrices of the system
13	New methods of analysis of train and track problems such as moving coordinates
14	An introduction of train and track interaction in the frequency domain
15	Analysis train derailment
16	Fatigue analysis of Track

EVALUATION PROCEDURES AND GRADING CRITERIA

Homeworks (5%), Project (20%), Midterm (30%), Final (45%)

ATTENDANCE STATEMENT

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SYLLABI ON WEB PAGES

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ADVANCED RAILWAY DESIGN

BASIC INFORMATION

Course prefix, title and semester: Core, Advanced Railway Design, Q1

Number of credits: 3

COURSE PREREQUISITES:

-

COURSE CO-REQUISITES:

-

TEACHERS:

Person in charge: Dr. Mohammad Hassan Esmaeili
Office location: Faculty of Civil Engineering and Transportation, University of Isfahan, Hezar-Jerib av., Isfahan, Iran
Phone Number: +983137934225
Email Address: m.h.esmaeili@eng.ui.ac.ir

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
3 hrs.	-	1 hr.	1 hr.

COURSE OBJECTIVES

The aim of this course is to study modern railway track systems and high-speed railway. Student learn loading analysis and modern systems mechanical behavior.

REQUIRED STUDENT RESOURCES

Textbooks:

References:

1- Esveld, Coenraad, and Coenraad Esveld. Modern railway track. Vol. 385. Zaltbommel: MRT-productions, 2001.
2- Lei, Xiaoyan. High speed railway track dynamics. Berlin: Springer, 2017.
3- Lichtberger, Bernhard. Track compendium. PMC Media House, 2011.

Computer Software:

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week	Topic
1	Introduction of modern railway system (Ballast-less) and its advantages.
2	Modern railway track classification
3	Analysis and design of slab track
4	Analysis and design of ladder track
5	Loading and analysis of super/sub-structure of high speed
6	High speed track stability and its behavior under vertical, lateral and longitudinal loads
7	super/sub structure design of High speed railway
8	Asphalted railway track
9	design and application of reinforced sub structure
10	Application of new material and components
11	Fatigue and fracture phenomena in railway components
12	Modeling track for Lateral stability analysis
13	Track buckling in CWR
14	Noise and vibration mitigation in railway tracks
15	Seismic effects for railway track design
16	projects

EVALUATION PROCEDURES AND GRADING CRITERIA

Home works (10%), Project (20%), Final (70%)

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TRACK LABORATORY

BASIC INFORMATION

Course prefix, title and semester: Core, Track laboratory, Q2

Number of credits: 1

COURSE PREREQUISITES:

Advanced Railway Design

COURSE CO-REQUISITES:

-

TEACHERS:

Person in charge: Dr. Mohammad Hassan Esmaeili
Office location: Faculty of Civil Engineering and Transportation, University of Isfahan, Hezar-Jerib av., Isfahan, Iran
Phone Number: +983137934225
Email Address: m.h.esmaeili@eng.ui.ac.ir

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
-	-	2 hr.	45 min.

COURSE OBJECTIVES

The aim of this course is to study and performing track tests in laboratory.

REQUIRED STUDENT RESOURCES

Textbooks:

References:

1- Lichtberger, Bernhard. Track compendium. PMC Media House, 2011.

Computer Software:

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week	Topic
1	Track static loading test
2	Track dynamic loading test
3	Fatigue tests for track components
4	Photo-elasticity tests for rail
5	Rail stress distribution test
6	Cyclic loading of ballast aggregate
7	Railway Material tests (Polymers, Steel, Wood…)
8	Performance tests in railway fastenings
9	Railway vibration Assessment Tests

EVALUATION PROCEDURES AND GRADING CRITERIA

Home works (30%), Project (20%), Final (50%)

ATTENDANCE STATEMENT

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SYLLABI ON WEB PAGES

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FINITE ELEMENT METHOD

BASIC INFORMATION

Course prefix, title and semester: Optional, Finite Element Method, Q1
Number of credits: 3

COURSE PREREQUISITES:

Advanced Engineering Mathematics

COURSE CO-REQUISITES:

-

TEACHERS:

Person in charge: Dr. Meysam Jahangiri
Office location: Faculty of Civil Engineering and Transportation, University of Isfahan, Hezar-Jerib av., Isfahan, Iran
Phone Number:
Email Address: m.jahangiri@cet.ui.ac.ir

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
3 hrs.	-	-	1 hr.

COURSE OBJECTIVES

Knowledge of finite element methods in solving differential equations governing continuum models and acquiring analytical skills, especially in solving solid mechanics problems.

REQUIRED STUDENT RESOURCES

Textbooks and References:

- O.C. Zienkiewicz, and R.L. Taylor, The Finite Element Method, Vol. 2, McGraw-Hill, London, 2000.
- Daryl L. Logan, A First Course in the Finite Element Mothod, University of Wisconsin-Platteville, Fifth Edition
- J. N. REDDY, An Introduction to the Finite Element Method, Texas A & M University, Third Edition

Web links: -

Computer Software: Matlab, Abaquse

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week 16	Topic
1	Introduction to The Finite Element Method, Physical and Mathematical analysis process
2	Introduction to the stiffness method and development the truss equation
3	Introduction of Continuum models and their mathematical rules
4	Finite element method for the analysis of elastic continuum models
5	Introduction of shape functions
6	Development of beam equations
7	Development of frame and grid equations
8	Stress and Strain analysis and introduction of the kind of elements, One and two dimensional elements (Plane stress and strain and axial symmetry)
9	Finite element modeling: Mesh, Loads and boundary conditions
10	Practical consideration in modeling – Plan stress and strain
11	Finite element equations for concentrated mass systems
12	Isoparametric elements and numerical integration
13	Differential equations by the method of weighted Residuals and the Galerkin method
14	Computer algorithms of finite element method
15	Introducing the finite element method for nonlinear material problems
16	An introduction to the dynamic finite element method

EVALUATION PROCEDURES AND GRADING CRITERIA

Homework (5%), Project (20%), Midterm (30%), Final (45%)

ATTENDANCE STATEMENT

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SYLLABI ON WEB PAGES

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RAILWAY TRACK TEST

BASIC INFORMATION

Course prefix, title and semester: Optional, Railway Track Test, Q2

Number of credits: 3

COURSE PREREQUISITES:

Advanced Railway Track Sub-Structure

COURSE CO-REQUISITES:

-

TEACHERS:

Person in charge: Department of Railway Engineering and Transportation Planning
Office location:
Phone Number:
Email Address:

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
3 hrs.	-	1 hr.	1 hr.

COURSE OBJECTIVES

The aim of this course is to learn track component tests (basics, methods, principals and procedure). Student know the reason, aims and necessity of track tests and quality assurance of track materials.

REQUIRED STUDENT RESOURCES

Textbooks:
Class booklet

References:
1- Updated Iran, UIC/Euro-codes (Europe) and AREMA (America) railway standards and any technical reports for quality assurance.
2- Esveld, Coenraad, and Coenraad Esveld. Modern railway track. Vol. 385. Zaltbommel: MRT-productions, 2001.
3- J. Sadeghi. Basics and principle of track components tests and railway track quality assurance, 2019. (perisian)

Web links: -

Computer Software: Lab as per need

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week	Topic
1	Importance and necessity of quality assurance and control tests
2	Test methods and classification
3	Review of railway track components and their application
4	National and international railway components test standards
5	Rail quality tests
6	Fastening systems and connection tests
7	Sleeper types and their quality tests
8	Ballast quality control tests
9	Sub-ballast quality control tests
10	Subgrade quality control tests
11	Rail pads / elastomer quality control tests
12	Track geometry quality control and quality indices
13	Track structural defects quality control (Evaluation)
14	Slab track quality control tests
15	Track vibration control and modal test
16	Ride quality index

EVALUATION PROCEDURES AND GRADING CRITERIA

Home works (10%), Project (30%), Final (60%)

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SYLLABI ON WEB PAGES

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RAILWAY TRACK REPAIR & MAINTENANCE MANAGEMENT

BASIC INFORMATION

Course prefix, title and semester: Optional, Railway Track Repair & Maintenance Management, Q2

Number of credits: 2

COURSE PREREQUISITES:

-

COURSE CO-REQUISITES:

-

TEACHERS:

Person in charge: Department of Railway Engineering and Transportation Planning
Office location:
Phone Number
Email Address:

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
2 hrs.	-	-	45 min

COURSE OBJECTIVES

The aim of this course is to learn and study maintenance strategies, inspection and analysis of recorded data and cost. Student use Statistic models to do maintenance planning. RAMS and LCC tools will be elaborated. Student know Railway Track Maintenance and management framework and its computerized systems.

REQUIRED STUDENT RESOURCES

Textbooks:
Jardine, Andrew KS, and Albert HC Tsang. Maintenance, replacement, and reliability: theory and applications. CRC press, 2013.
References:
1- Jardine, Andrew KS, and Albert HC Tsang. Maintenance, replacement, and reliability: theory and applications. CRC press, 2013.
2- The Railway Track and Its Long Term Behaviour, A Handbook for a Railway Track of High Quality-Springer- 2013
3- Lichtberger, Bernhard. Track compendium. PMC Media House, 2011.
Computer Software: CMMS,

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week	Topic
1	Introduction and necessity of railway maintenance management
2	Structure and framework of maintenance management in Engineering
3	Introduction of maintenance management systems use in railway industry
4	Methods of evaluation of railway tracks quality
5	Resource and material for track repair and maintenance
6	Inspection and measuring methods and principals
7	Railway track Maintenance strategies
8	Preventive and predictive maintenance
9	Data banking /base, statistical analysis
10	Asset management in railway track infrastructure
11	Reliability, maintainability, availability and safety (RAMS) tools
12	Life cycle cost analysis (LCC) tools
13	Track degradation models
14	probability and its application in maintenance management
15	Strengthen methods and techniques of railway subgrade
16	Application of computerized maintenance management software (CMMS)

EVALUATION PROCEDURES AND GRADING CRITERIA

Home works (10%), Project (20%), Final (70%)

ATTENDANCE STATEMENT

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STUDENTS WITH DISABILITIES ACT FOR STUDENTS WITH SPECIAL NEEDS STATEMENT

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SYLLABI ON WEB PAGES

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SOFT COMPUTING METHODS IN RAILWAY ENGINEERING

BASIC INFORMATION

Course prefix, title and semester: Optional, Soft Computing Methods in Railway Engineering, Q2

Number of credits: 3

COURSE PREREQUISITES:

-

COURSE CO-REQUISITES:

-

TEACHERS:

Person in charge: Dr. Ahmad Reza Jafarian-Moghaddam
Office location: Faculty of Civil Engineering and Transportation, University of Isfahan, Hezar-Jerib av., Isfahan, Iran
Phone Number: +983137935318
Email Address: ar.jafarian@trn.ui.ac.ir

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
3 h	-	-	2 hrs

COURSE OBJECTIVES

The aim of this course is to train students with advanced algorithms for solving hard problems and their application in railway engineering.

REQUIRED STUDENT RESOURCES

Textbooks:

References:

1- Mokhtar S. Bazaraa, John J. Jarvis, Hanif D. Sherali, Linear Programming and Network Flows, 1990.
2- El-Ghazali Talbi, Metaheuristics: From Design to Implementation, John Wiley & Sons, 2009.
3- G.R. Liu, V.B.C. Tan, X. Han, Computational Methods, Springer, 2007.

Web links: -

Computer Software: GAMS, Matlab, Python

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week	Topic
1	Introduction to Linear and nonlinear programming
2	Time complexity and problems types
3	Introduction, history and types of soft computing methods
4	Iterative methods
5	Simulated annealing
6	Tabu search
7	Population base methods
8	Artificial neural network
9	Genetic algorithms and programming
10	Constructive methods
11	Ant colony optimization (ACO)
12	Types of ACO
13	Hybrid and Hyper algorithms
14	Fuzzy logic
15	Fuzzy optimization
16	Soft computing methods application in railway engineering (project)

EVALUATION PROCEDURES AND GRADING CRITERIA

Home works (5%), Project (10%), Midterm (35%), Final (50%)

ATTENDANCE STATEMENT

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SEMINAR AND RESEARCH METHOD

BASIC INFORMATION

Course prefix, title and semester: Seminar and Research method, Q2

Number of credits: 2

COURSE PREREQUISITES:

-

COURSE CO-REQUISITES:

-

TEACHERS:

Person in charge: Dr. Ahmad Reza Jafarian-Moghaddam
Office location: Faculty of Civil Engineering and Transportation, University of Isfahan, Hezar-Jerib av., Isfahan, Iran
Phone Number: +983137935318
Email Address: ar.jafarian@trn.ui.ac.ir

WEEKLY HOURS

Theory	Problem Solving	Laboratory	Guided learning
2 h	-	-	60 min

COURSE OBJECTIVES

This course aims to familiar students with the research procedure, ethical principles and challenges, the scientific searching and indexing, the methods of presentation and scientific speech, and the principles of writing research proposals and thesis. Students will use these theoretical underpinnings to begin to critically review literature relevant to their field or interests.

REQUIRED STUDENT RESOURCES

Textbooks:

References:

1- R. R. Powell and L. S. Connaway, “Basic Research Methods for Librarians”, 5th Edition (Library and Information Science Text Series), 2010.
2- R. K. Yin, “Case Study Research, Design, and Methods”, 5th Edition, Sage Publications, 2013.
3- W. K. Schuttle and E. Schuttle, “Communications Skills for the Information Age”, 3rd Edition, McGraw-Hill Book Co., 2001.
4- www.clarivate.com

5- www.scimagojr.com
6- scholar.google.com
7- www.endnote.com

Web links: -
Computer Software: Endnote, Mendeley

COURSE SCHEDULE/OUTLINE/CALENDAR OF EVENTS

Week	Topic
1	Definitions and familiarity with types of research
2	Knowing the generalities and objectives of the proposal and thesis
3	Research process
4	The problem solving process
5	methods of determining the topic for research (research topic criteria)
6	Familiarity with journals and their scientific level
7	Learning the journals ranking system
8	Indices for evaluation of research
9	How to search for scientific articles
10	Citing and referencing methods
11	Literature Reviews Fundamentals
12	Principles of ethics in research
13	Introduction to essay writing
14	Knowing and working with Endnote software
15	Key points in preparing slides and verbal presentations
16	Seminar by students

EVALUATION PROCEDURES AND GRADING CRITERIA

Home works (30%), Project (70%), Midterm (-), Final (-)

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