Faculty of Natural Resources
Department of Geomorphology

MA/MSc Program in Geomorphology and Spatial Planning of Environment	
Course Type	**Credits**
General	**-**
Basic	**12**
Main	**18**
Compulsory	**-**
Optional	**-**
Total	**30**

دانشگاه کردستان
University of Kurdistan
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Program Title:			
Course Title: **Theoretical Ideas in Geography and Geomorphology**	Credit Number: **2**	Type: **Basic-Theoretical**	Prerequisites/Co-requisites: **-**
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ☐ Workshop: ☐ Laboratory: ☐ Seminar ■ Presentation: ☐	

Course Objectives:

- Familiarize Students with the Ideas and Theories about the Formation and Evolution of Landforms and Familiarity with Analytical Schools in Geomorphology

Syllabus:

- Familiarity with fundamental concepts in Geomorphology
- Macro Perspective in Geography ((Hermeneutics, Scientific Perspective, Systematic Perspective, The Perspective of Mysticism and Enlightenment)
- Hutton, Horton, Davis, Darwin, Dana, Lyell Theories
- Davis Geomorphology, Gilbert's theories
- Process Geomorphology
- Systematic Geomorphology and Equilibrium in Geomorphology
- Environmental perspectives in Geomorphology

References:

- Richard J. Chorley, Stanley A. Schumm & David E. Sugden, (2000), Geomorphology (Vol. I). Translated by Dr. Ahmad Motamed, in collaboration, Samat Publications, Tehran.
- Moghimi E. (2001), Philosophy of Environmental Change, University of Tehran Publication.
- Inkpen Rob, Science, Philosophy and Geography, Routledge, (2005).
- Rhoads B L & Thorn C E. (1996), The Scientific Nature of Geomorphology. In Proceedings of the 27th Binghamton Symposium in Geomorphology held (pp.27-29).
- Domenikiotis, C. Loukas, A & Dalezios N R. (2002). Natural Hazards and Earth System Science, Routledre.

دانشگاه کردستان
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Program Title:			
Course Title: **Advanced Remote sensing and GIS in Geomorphology**	Credit Number: **2**	Type: **Basic-Theoretical**	Prerequisites/Co-requisites: -
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ☐ Workshop: ■ Laboratory: ☐ Seminar ☐ Presentation: ☐	

Course Objectives:

- Creating skills for students to prepare and interpret reflective and thermal satellite images and quantitative models in GIS

Syllabus:

- Familiarity with different types of databases in GIS
- Spatial interpolation methods and its evaluation methods
- Spatial analysis of geomorphological data in GIS environment
- Elevation models and three-dimensional analysis
- Widely used sensors in geomorphology
- Familiarity with one of the remote sensing software
- How to enter satellite images using software, SPOT, IKONOS, IRS, ETM satellite images
- Clarifying spectral and geometric characteristics, preparing of color combinations and examining the amount of displacement between the original image and the map
- Performing geometric correction using software, determining ground control points and checkpoints, evaluating accuracy
- Steps of preparing a map from satellite images
- Annotation and interpretation of images
- Classification and extraction of information

References:

- Alavipanah, S.K. (2016). Remote sensing in soil and earth sciences, University of Tehran Press (In Persian)
- Williams, J. (2001). GIS processing of geocoded satellite data. Springer.
- Bishop, M., & Shroder, J. F. (2004). Geographic information science and mountain geomorphology. Springer Science & Business Media.
- Anbazhagan, S., Subramanian, S. K., & Yang, X. (Eds.). (2011). Geoinformatics in applied geomorphology. CRC Press.
- Sagar, B. S. D. (2013). Mathematical morphology in geomorphology and GISci. CRC Press.
- Ramasamy, S. M. (2005). Remote sensing in geomorphology. New India Publishing.

دانشگاه کردستان
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Program Title:			
Course Title: **Field and Laboratory Techniques in Geomorphology**	Credit Number: **2**	Type: **Basic-Theoretical**	Prerequisites/Co-requisites: **-**
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ■ No ☐ Scientific Trip: ■ Workshop: ☐ Laboratory: ■ Seminar ☐ Presentation: ☐	

Course Objectives:

- Familiarity with fieldwork methods for conducting geomorphological research and familiarity with laboratory tools used in projects and basic and applied research in geomorphology and obtain skills to use these tools.

Syllabus:

- Theoretical foundations, generalities and concepts, and the need for fieldwork in geomorphological research and the need for practical work in specialized topics of research methods.
- Topographic, geological and geomorphological analyzes from maps
- Tools and methods of measuring on the ground and methods and tools of sediment sampling
- Laboratory tools and methods
- Indirect Earth Observation Tools
- Practical work
- Practical work of sedimentology
- Working with GPS
- Measurement on the ground

References:

- Yamani M and Gorabi A., 2016, Geomorphology and Environmental Engineering. University Jahad Publications, Tehran
- Motavvali S, Hossainzadeh M.M, Esmaeeli R., 2013, Field techniques in river geomorphology. Shahid Beheshti University Press, Tehran
- Geomorphological Techniques, 2012, British Society for Geomorphology
- Edwards, T. K., & Glysson G. D., 1991, Field methods for measurement of fluvial sediment. No 03 – C2, US Geological Survey; Information Services

دانشگاه کردستان
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Program Title:			
Course Title: **Geomorphology and Lithology**	Credit Number: **2**	Type: **Basic-Theoretical**	Prerequisites/Co-requisites: **-**
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ☐ Workshop: ■ Laboratory: ☐ Seminar ☐ Presentation: ☐	

Course Objectives:

- Increasing student information on the relationship and role of lithology and geomorphology
- The role of rock control in the evolution of geomorphic landscapes

Syllabus:

- Study of microscopic and microscopic properties of rock-forming minerals
- The scientific study of rocks
- Rocks and Landforms
- The evolution of geomorphic landscapes and rock properties
- Rocks resistance to weathering
- The profile of weathering and the evolution of landforms
- Instability in the cracked rock
- Igneous Landforms
- Landforms in sedimentary rocks
- Properties and landforms of mudrocks
- Structural landform (landforms associated with fault and floded)

References:

- Gerrard, A.J. 1988. Rocks and land forms. Unwin Hyman, London
- Piotr Migon, 2006, Granite Landscapes of the World, Oxford University Press, Oxford, New York
- Raymond, L.A., 2002, Petrology The study of igneous, sedimentary and metamorphic rocks. 2nd Edition, McGraw Hill, New York, 720 p.
- G. Taylor, R. A. Eggleton, 2001, Regolith Geology and Geomorphology. John Wiley & Sons, 384
- Richard J. Chorley, Stanley A. Schumm, DavidE. Sugden , 1985, Translated by Ahmad Motamed, NewYork:Methune& Co.

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Program Title:			
Course Title: **Techniques and Models in Geomorphology**	Credit Number: **2**	Type: **Basic-Theoretical**	Prerequisites/Co-requisites: **-**
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ☐ Workshop: ■ Laboratory: ☐ Seminar ■ Presentation: ☐	

Course Objectives:

- Creating students' skills in familiarity and application of methods and techniques

Syllabus:

- Generalities and definitions (presentation of epistemological devices and research method patterns) and familiarity with various techniques (in epistemological fields)2- Spatial interpolation methods and its evaluation methods
- Defining and recognizing the problem (addressing the main cause of the problem), data collecting, determining the evaluation criteria and indicators, formulating the model and establishing the relationship between the criteria and indicators, process and problem studied, check the accuracy and performance of the planned model
- Investigating the types of mathematical models and probabilistic mathematical models, experimental models (natural models in geomorphology, linear and non-linear models, random models in geomorphology)
- Modeling the changes of landforms and geomorphic systems using mathematical and equilibrium models.
- Using software techniques in geomorphological analysis and using statistical software
- AHP method and TOPSIS, Multi Variable, SWOT techniques in classification and evaluation of environmental systems

References:

- Azadbakht. B. (2016). Geomorphology Techniques, Aeezh Press. (In Persian)
- Cook, S.J., Clarke, L.E. & Nield, J.M. (Eds.) Geomorphological Techniques (Online Edition). British Society for Geomorphology, London. ISSN: 2047-0371
- Bishop, M., & Shroder, J. F. (2004). Geographic information science and mountain geomorphology. Springer Science & Business Media.
- Shroder. J. (2013). Treatise on Geomorphology, In Elsevier Inc

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Program Title:			
Course Title: **Geomorphology and Surface Sediment**	Credit Number: **2**	Type: **Basic-Theoretical**	Prerequisites/Co-requisites: -
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ☐ Workshop: ■ Laboratory: ■ Seminar ☐ Presentation: ☐	

Course Objectives:

- Acquaintance of students with surface sediments and geomorphological perspectives

Syllabus:

- Production of sediment at the Earth's surface (Weathering, chemical process and biological activity)
- Fundamentals of fluid flow, sediment transport, erosion, and deposition
- Sediment into rock: diagenesis
- Combination of chemical and organic sediments
- Sedimentology of Alluvial fan, Rivers and Floodplains.
- Lake sediments
- Sediments in of Estuaries
- Sediments of arid region and playa
- Sediment in glacial and pre glaciers

References:

- H.E. Wright & Jr. Minneopolis, Eiszeitalter (1962) Pleistocene Glaciation in Kurdistan, Geogenmart, Band12, Seite 131-164, Ohringen/Wurtt, 45.
- Mohsen Ranjbaran, Mohammad Lankarani and Seyed Mohammad Zamanzadeh Khosraghi. "Applied Clay Mineralogy." Tehran: Tehran University Press, 2012.
- Perillo.G.M.E (1995) Development in Sedimentology- Geomorphology and Sedimentology of Estuaries, Elsevier Science.
- T. A. John Bridge, 2008, Earth Surface Processes, Land forms and Sediment Deposits, , Cambridge University Press
- Philip A. Allen, 2017, Sediment Routing Systems, the Fate of Sediment from Source to Sink. Cambridge University Press
- Douglas W. Lewis, David McConaughey / Translated by Abdul Hussein Amini, Seyed Mohammad Zamanzadeh, Analytical Sedimentology, University Publishing Center Publications

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Program Title:			
Course Title: **Geomorphology and Cultural locals**	Credit Number: **2**	Type: **Main -Theoretical**	Prerequisites/Co-requisites: **-**
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ■ Workshop: ■ Laboratory: ☐ Seminar ☐ Presentation: ☐	

Course Objectives:

- Familiarity of students with the role of geomorphology in the protection of cultural and historical resources

Syllabus:

- Concepts and principles of cultural geomorphology
- Concepts of cultural geology and geomorphology
- Weathering and decay in relation to the management of cultural resources
- Geomorphology and protection of historical monuments and archeological sites
- Application of geomorphology in the discovery of ancient sites
- Geomorphic environments and reducing the effects of mental and neurological diseases, etc.
- Assessing the natural hazards of cultural environments
- Geomorphology and Management of Cultural areas

References:

- Geomorfologia Culturale. Pitagora, 2003, Panizza M. & Piacente S. Editrice, Bologra.
- Kondolf, G. M., & Picgay, H., 2011, Geomorphology and society. K. J. Gregory, & A. Goudie (Eds). Na.
- Szabo, J., 2010, Anthropogenic geomorphology: subject and system. In Anthropogenic Geomorphology (pp, 3 – 10), Springer Nertherlands

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Program Title:			
Course Title: **Geomorphology and Spatial planning of Water Recourses**	Credit Number: **2**	Type: **Main -Theoretical**	Prerequisites/Co-requisites: -
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ☐ Workshop: ☐ Laboratory: ☐ Seminar ■ Presentation: ☐	

Course Objectives:

- Familiarity of Students with the Geomorphological Problems of Spatial Planning of Water Recourses and its Relationship with Sustainable Development
- The Role of Geomorphology on the Spatial Planning of Water Resources Systems, Land Use, Reducing Instability and Environmental Crises

Syllabus:

- Principles of Geomorphology in spatial planning of water resources
- Changes in water resources and its place in land management
- Geomorphology and spatial planning of water resources of cities and villages
- Fluvial Geomorphology and spatial planning of water resources
- The Place of Geomorphological maps in environmental planning
- The Place of Geomorphological maps in the spatial planning of watersheds
- Spatial Planning of water resources and Geomorphologic hazards
- Water Resources development methods to respond to population growth and high-water consumption and their environmental impacts
- Development of infrastructure in water basins and their environmental impacts
- Methods, models and theoretical foundations of spatial planning water resources

References:

- Water Resources Management, (2008), Sabzandish Managers Project Publications.
- Laumer W. (2010), Environmental planning for water, Transportation and Land Use, Mc Graw- Hill Companies.
- Daniel P. L & Beek E. (2005), Water Resources System Planing and Management an Introduction to Methods, Models and Application. UNESCO Publication

Program Title:			
Course Title: **Geomorphology and Spatial Planning of Urban and Rural**	Credit Number: **2**	Type: **Main -Theoretical**	Prerequisites/Co-requisites: **-**
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ■ Workshop: ■ Laboratory: ☐ Seminar ☐ Presentation: ☐	

Course Objectives:

- Understanding the concepts and application of geomorphology and urban and rural location planning

Syllabus:

- Geomorphological topics and urban and rural location planning (Opinion and Policy – making)
- General concepts and scope of engineering geomorphology
- Application of geomorphology in Spatial planning (urban and rural planning)
- Geomorphological index as a support for urban and rural planning
- Effective geomorphic process and Evaluation in planning (urban and rural planning)
- Geological factors affecting the formation of urban and rural space(tectonic and structure processes)
- Nature of bed stone and urban issues
- fluvial geomorphology and landscape urban and rural design
- Hazards of Geomorphology and Engineering Geomorphology in urban and rural design
- Geomorphological mapping urban and rural space
- Engineering Geomorphology and urban building

References:

- Hari Shanker Sharma, S. C. Kalwar,2018. Geomorphology and Environmental Sustainability, Routledge
-
- P. G. Fookes , E Mark Lee , J. S. Griffiths.2007, Engineering Geomorphology, Theory and practice
- Ebrahim Moghimi,2010, Urban Geomorphology, Tehran, Iran

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Program Title:			
Course Title: **Geodiversity**	Credit Number: **2**	Type: **Main -Theoretical**	Prerequisites/Co-requisites: -
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ■ Workshop: ☐ Laboratory: ☐ Seminar ■ Presentation: ☐	

Course Objectives:

- Familiarity of Students with the Elements and Indices of Geodiversity in the Management of Geomorphological Units

Syllabus:

- Concepts and theories in Geodiversity
- The main elements of Geodiversity
- The relationship between Geomorphology and Geodiversity
- Geomorphological and Geodiversity indices
- Geodiversity evaluation Models and Techniques
- Assessment of environmental potentials of Geomorphological units based on Geodiversity models
- Evaluation and Forecasting of Geomorphological hazards by Geodiversity indices
- Methods, Models and Theoretical infrastructures the role of Geodiversity in planning and
- sustainable development
- Interdisciplinary research using relevant scientific tools in establishing environmental security in Geomorphological units

References:

- Murray Gray. (2013), Geodiversity: Valuing and Conserving Abiotic Nature, 2nd Edition, Wiley
- Silva J P. Rodrigues C. (2014), Mapping and Analysis of Geodiversity Indices in the Xiang River Basin, Amazonia, Brazil

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Program Title:			
Course Title: **Geomorphological Hazard Management**	Credit Number: **2**	Type: **Main -Theoretical and Practical**	Prerequisites/Co-requisites: **-**
Instructor: **Geomorphologist**	Hours: **48**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ■ Workshop: ☐ Laboratory: ☐ Seminar ■ Presentation: ☐	

Course Objectives:

- Familiarity with the role of geomorphology in structural and Non-structural methods of geomorphological hazards management

Syllabus:

- The domain of geomorphology in structural and non-structural methods in reducing and preventing hazards
- Application of geomorphology in the management and control of Mass Movements
- Application of geomorphology in the management and control of coastal geomorphological processes and issues
- Application of geomorphology in the management and control of wind processes and their hazards
- Application of geomorphology in the management and monitoring of new tectonics and subsidence
- Application of geomorphology in the management and monitoring of volcanic eruptions and their hazards
- Application of geomorphology in earthquake management and monitoring and its geomorphological hazards
- Application of geomorphology in the management and control of river processes, floods and floodplains
- Application of geomorphology in the preparation of Atlas of Iranian Hazards

References:

- Moghimi E and Godarzinezhad Sh., 2003, Environmental hazards. SAMT Publications, Tehran.
- Moghimi E., 2015, Knowledge of hazards. Tehran University Press.
- Iaymaker S, Introduction O. In: Iaymaker S, O. (Ed.), Geomorphic Hazards. Wiley.
- Environmental Hazards: Challenges and Management. 2008, Chichester, S. N, Prasad, Jaipur, Pointer Pub, 180 P.
- Smith, K., 2013, Environmental hazards: assessing risk and reducing. Routledge

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Program Title:			
Course Title: **Geomorphology and Soil Erosion Management**	Credit Number: **2**	Type: **Main -Theoretical**	Prerequisites/Co-requisites: -
Instructor: **Geomorphologist**	Hours: **32**	Supplementary Training: Yes ☐ No ■ Scientific Trip: ☐ Workshop: ☐ Laboratory: ■ Seminar ☐ Presentation: ☐	

Course Objectives:

- Familiarity of students in the field of soil studies and management methods

Syllabus:

- Familiarity with the applied concepts of soil geomorphology
- Soil historiography and landscape developments and reconstruction of the environment using soil developments
- Territorial levels in geomorphology and landscape divisions
- Physical properties of soil, soil profile and its different horizons
- weathering, soil birth, the role of maternal characteristics in determining the type and characteristics of soil
- Land capability and soil divisions
- Soil sensitivity to geomorphic and erosion processes
- Soil classification and taxonomy
- Soil audit and preparation of soil erosion maps
- Familiarity with the principles of soil management methods, saline soils and how to manage it

References:

- Ramesht. M.H. (2005). Geography of soils, Esfahan University Press. (In Persian)
- Bayati Khatibi, M., Karami, F. (2011). Geomorphology of Soil, Samt Press. (In Persian)
- Williams, J. (2001). GIS processing of geocoded satellite data. Springer.
- Zinck, J. A., Metternicht, G., & Bocco, G. (2016). Geopedology. An Integration of Geomorphology and Pedology for Soil and Landscape Studies. Springer Press.
- Pope, G. (2013). Overview of weathering and soils geomorphology. In Treatise on Geomorphology (pp. 1-11). Elsevier Inc.