

ENVIRONMENTAL IMPACT AND RISK ASSESSMENT

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
ENVIRONMENTAL IMPACT AND RISK ASSESSMENT	02	0	0	02	Class XII with Science	NA

Learning Objectives

- To gain insights into the concepts of environmental impact assessment (EIA) and its relevance for sustainable development
- To acquire knowledge of the socio-ecological and economic perspectives of any developmental project.
- To evaluate methodologies to conduct and analyze EIA acceptable per prevalent regulations

Learning outcomes

The Learning Outcomes of this course are as follows.

After studying the course, the students will be able to:

- Conduct EIA of any developmental project and analyze its environmental and other implications
- Serve as consultant to different agencies working on EIA and a developmental plan
- Evolve strategies to ensure development and conservation hand-in-hand
- Formulate sustainable development strategies for any development plan varying in scale
- Identify and classify different development projects based on their sales and impacts on the environment

SYLLABUS

Practical

(02 Credits: 60 hours)

1. Based on the given project details, classify them as Category A and Category B1 and B2 projects.
2. Prepare the scope of any recent developmental project of Category A which received Environmental Clearance.
3. To prepare a questionnaire and compilation of primary data to study the scope of the project based on public participation.
4. Identify the impacts due to a Mining Project using the checklist method.
5. Based on the impacts identified in Activity 4, formulate mitigating measures for the project.
6. Determine the impacts due to a large-scale hydropower project in a given state using the matrix method and geo-spatial data,
7. Prepare an environmental management plan for a mining project.
8. To conduct a public hearing for any project and prepare a draft for the process.
9. Prepare a brief life cycle assessment of a smartphone.
10. Prepare a brief EIA report of a River Valley Project.

Teaching learning interface for practical skills

To impart training on technical and analytical skills related to the course objectives, a wide range of learning methods will be used, including (a) laboratory practicals; (b) field-work exercises; (c) customized exercises based on available data; (d) survey analyses; and (e) developing case studies; (f)

demonstration and critical analyses; and (h) experiential learning individually and collectively.

Prospective Sectors:

As per the Ministry of Environment, Forests, & Climate Change (MoEF&CC), Govt. of India, ~30 sectors require EIA for Environmental Clearance before any project activity. Some of them include Mining, Oil and gas exploration, development & production, River valley, hydel, drainage and irrigation projects, thermal Power plants, Nuclear power projects, Coal washeries, Mineral, Metallurgical industries, Cement plants, Petroleum industry, Coke oven plants, Asbestos milling, Chlor-alkali industry, Soda ash Industry, Chemical fertilizers, Pesticides industry, Synthetic organic chemicals industry, Distilleries, Integrated paint industry, Pulp & paper industry, Induction/arc furnaces, Air ports, All ship breaking yards, Industrial estates, Common hazardous waste treatment, storage and disposal facilities, Highways, railways, transport terminals, mass rapid transport systems, Building and large construction projects, Townships, and area development projects.

Essential/recommended readings

- EIA 2020. Ministry of Environment, Forest and Climate Change, Draft Environment Impact Assessment Notification, 2020, <http://environmentclearance.nic.in/writereaddata/om/6998FGGHOI_Gaztte_EIA2020_Comments.pdf>.
- Glasson, J. and Therivel, R., 2013. Introduction to Environmental Impact Assessment. Routledge.
- MacKinnon, A.J., Duinker, P.N. and Walker, T.R., 2018. The Application of Science in Environmental Impact Assessment. Routledge.
- Mareddy, A.R. (2017) Environmental Impact Assessment Theory and Practices, Butterworth Heinemann.

Suggested readings

- Judith, P. 1999. Handbook of Environmental Impact Assessment. Blackwell Science.
- Lawrence, D.P., 2013. Impact assessment: practical solutions to recurrent problems and contemporary challenges. John Wiley & Sons.
- Marriott, B. 1997. Environmental Impact Assessment: A Practical Guide. McGraw-Hill, New York, USA.
- Petts, J. (1999). Handbook of Environmental Impact Assessment. Vol. 1, Blackwell Science.

Examination scheme and mode:

Evaluation scheme and mode will be as per the guidelines notified by the University of Delhi.

SUSTAINABILITY REPORTING

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
SUSTAINABILITY REPORTING	02	0	0	02	Class XII	NA

Learning Objectives

- To gain insights into the step-by-step process of writing a sustainability report using internationally acceptable standards.
- To evolve a holistic view of sustainability and understand the carrying capacity of ecosystems for human needs.
- To acquire skills to address sustainability challenges in a global context.
- To evaluate industrial/organizational processes/programmes based on the interconnections among economic, environmental, and social activities

Learning outcomes

The Learning Outcomes of this course are as follows.

After studying the course, the students will be able to:

- Develop a multi-disciplinary and holistic perspective of sustainability and identify key factors determining sustainability and associated benefits
- Write sustainability reports using universal, sector, and topic standards
- Explain sustainability challenges and effective methods to communicate it to different stakeholders
- Apply sustainability concepts, and GRI Standards for sustainable industries
- Serve as environmental consultants to different industries
- Advise governments on sustainable environmental policies

SYLLABUS

Practical/Hands-on Exercises

(02 Credits: 60 hours)

1. Investigate the framework for sustainability reporting outlined by global reporting initiatives (GRI)
2. Analyse universal, sector, and topic standards given by GRI
3. Develop sustainability reporting of your institute
4. Examine and report the sustainability of your residential society or residential area around your College
5. Compare and contrast sustainability reporting of the market in your neighbourhood and the selected mining industry
6. Visit a thermal power plant in and around your city and write its sustainability report

7. Using appropriate standards, evaluate the sustainability of a Cement Factory in your city
8. Field survey of a waste treatment facility in your city, assess their sustainability and give recommendations if required.
9. Analyze the potential and limitations of certified tools and software recommended by the GRI for sustainability reporting
10. Examine and evaluate sustainability reports available on different sectors and topics worldwide and give appropriate recommendations, if any.

Teaching learning interface for practical skills

To impart training on technical and analytical skills related to the course objectives, a wide range of learning methods will be used, including (a) laboratory practicals; (b) field-work exercises; (c) customized exercises based on available data; (d) survey analyses; and (e) developing case studies; (f) demonstration and critical analyses; and (h) experiential learning individually and collectively.

Prospective Sectors:

All Multi-National Companies, (b) Environmental and Sustainability Consultancies, (c) Environmental NGOs, (d) World Bank, and (e) UNDP

Essential/recommended readings

- Bini, L. and Bellucci, M., 2020. Integrated Sustainability Reporting: Linking Environmental and Social Information to Value Creation Processes. Springer.
- A Short-Introduction to GRI Standards. <https://www.globalreporting.org/media/wtafl4tw/a-short-introduction-to-the-gri-standards.pdf>
- Evaluating National Policies on Corporate Sustainability Reporting <https://wedocs.unep.org/handle/20.500.11822/9435>
- Gutterman, A.S., 2021. Sustainability Reporting and Communications. Business Expert Press.
- Sustainability Reporting in the Financial Sector: A Governmental Approach <https://wedocs.unep.org/handle/20.500.11822/17375>
- United Nations Environment Program (UNEP), 2015. Raising the bar: Advancing environmental disclosure in sustainability reporting.

Suggested readings

- Greiling, D., Traxler, A.A. and Stötzer, S., 2015. Sustainability reporting in the Austrian, German and Swiss public sector. International Journal of Public Sector Management.
- <https://www.globalreporting.org/reporting-support/reporting-tools/certified-software-and-tools/>

Examination scheme and mode:

Evaluation scheme and mode will be as per the guidelines notified by the University of Delhi.

ENVIRONMENTAL AUDITING

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
ENVIRONMENTAL AUDITING	02	0	0	02	Class XII	NA

Learning Objectives

- To gain an understanding of the fundamental principles and components of environmental auditing
- To train in conducting an environmental audit in any organization/ institution
- To implement critical thinking toward environmental problems and formulate local solutions for their mitigation

Learning outcomes

After studying the course, the students will be able to:

- Conduct an environmental audit in a scientific manner
- Recommend organizations to adopt specific sustainable strategies
- Serve as catalyst to evolve sense of ownership and responsibility among organizations/industries towards solving local environmental problems.
- Pursue environmental auditing for higher studies and a future career.

SYLLABUS

Practical/Hands-on Exercises

(02 Credits: 60 hours)

1. Prepare a working plan (in the form of a flowchart/ graphical abstract) for the environmental audit of any organization/ institution focusing on pre-audit, on-site and post-audit objectives and activities
2. Prepare a brief profile of any selected organization/ institution (Area, land use, green cover, organizational setup, demography etc.) and discuss its environmental policy and the environmental management systems
3. Prepare an interpretive electricity consumption report of the organization/ institution over a five-year period (both actual or arbitrary data can be used).
4. Prepare an interpretive water consumption report of the organization/ institution over a five-year period (both actual or arbitrary data can be used). Also, identify the sources of wastewater discharge and its management, if any.
5. Survey the campus and prepare a list of the plant/ animal (or both) diversity, highlighting its importance and threats faced.

6. Prepare a monthly air quality level dataset nearest to the institution's location, extracting data from the National Air Quality Index (CPCB) website. Prepare a report on causes of variation and measures taken by an organization to improve air quality levels
7. Prepare a comprehensive assessment report of Solid Waste Management at the organization/ institution highlighting compliance to Solid Waste Management Rules, 2016.
8. Formulate a scientifically sound protocol for identifying and disposing of e-waste and hazardous waste at any organization based on E-waste (management) rules, 2016 and Hazardous waste (management) rules, 2016.
9. Examine various environment-related practices and activities of the organization/ institution that have impacted the neighbouring communities and prepare a social audit questionnaire for studying the impact.
10. Compile the data, results, and analysis of all previous practicals and prepare a detailed environmental audit report of your selected organization/ institution.

Teaching learning interface for practical skills

To impart training on technical and analytical skills related to the course objectives, a wide range of learning methods will be used, including (a) laboratory practicals; (b) field-work exercises; (c) customized exercises based on available data; (d) survey analyses; and (e) developing case studies; (f) demonstration and critical analyses; and (h) experiential learning individually and collectively.

Prospective Sectors:

- (a) Universities/Colleges, (b) Environmental Consultancies, (c) Environmental NGOs, and (d) Indian Audit & Revenue Departments

Essential/recommended readings

- Cahill, L.B (2017). Environmental Health and Safety Audits: A Compendium of Thoughts and Trends, 2nd Edition, Bernan Press.
- Council, N.C., Britain, G. and Unit, E.F., 2011. Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit. Nature Conservancy Council.
- Ho G, Anda, M., Brennan, J., 2015. Water Auditing and Water Conservation. IWA Publishing
- Pain, S.W., 2010. Safety, Health, and Environmental Auditing: A Practical Guide. CRC Press.
- Thuman, A., Niehus, T., Younger, W.J., 2012. Handbook of Energy Audits, 9th ed. Routledge, Taylor and Francis
- Van Guilder, C.V., 2014. Environmental Audits. Mercury Learning & Information.

Suggested readings

- Barton, H., and Bruder N., 1993. A Guide to Local Environmental Auditing. Routledge, Taylor and Francis

Examination scheme and mode:

Evaluation scheme and mode will be as per the guidelines notified by the University of Delhi.

PROSPECTING E-WASTE FOR SUSTAINABILITY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Prospecting E-Waste for Sustainability	2	0	0	2	Class XII	NA

Learning Objectives

The Learning Objectives of this course are as follows:

- To provide in-depth knowledge on the effective mechanisms to regulate the generation, collection, and storage of e-waste
- To gain insights into the internationally/nationally acceptable methods of transport, import, and export of e-waste within and between countries
- To develop a holistic view on recycling, treatment, and disposal of e-waste and related legislative rules.

Learning outcomes

The Learning Outcomes of this course are as follows:

- After studying this course, students will be able to holistically analyze the environmental impacts of e-waste
- After studying this course, students will be able to apply the skills and various concepts for sustainable management of e-waste
- After studying this course, students will be able to decipher the role of various national and international regulations for e-waste management
- After studying this course, students will be able to provide specific recommendations for improved methods for handling e-waste at different stages such as generation, collection, storage, transport, and recycling

SYLLABUS

Practical/Hands-on Exercises

(02 Credits: 60 hours)

1. Identification of e-waste and its types
2. Composition of e-waste and segregation- from the material provided
3. Dismantling of e-waste and handling process
4. Visit a nearby e-waste handling facility
5. Environmental protection laws and producer's responsibility for e-waste management
6. Build an understanding of how regulatory mechanisms can be utilized in the management of e-waste in educational institutions.
7. Discussion on plausible ways and implementation of e-waste reduction at the source
8. Evaluation of the status of e-waste handling at your institution. Suggest potential solutions as per the existing norms of E-Waste (Management) Rules, 2016 and beyond.

9. Estimate how recycling of e-waste in metro cities will go in sync with the circular economy
10. Develop an understanding and itinerary of the process for procuring e-waste import permissions.
11. Inventory of the e-waste disposal mechanisms.
12. Study the evolution of e-waste management rules and its implementation- Hazardous Waste Rules, 2008, E-waste (Management and Handling) Rules, 2011; and E-Waste (Management) Rules, 2016
13. Study the international laws on e-waste management- the international legislations: The Basel Convention; The Bamako Convention; The Rotterdam Convention; Waste Electrical and Electronic Equipment (WEEE) Directive in the European Union; Restrictions of Hazardous Substances (RoHS) Directive

Teaching and learning interface for practical skills:

To impart training on technical and analytical skills related to the course objectives, a wide range of learning methods will be used, including (a) laboratory practicals; (b) field-work exercises; (c) customized exercises based on available data; (d) survey analyses; and (e) developing case studies; (f) demonstration and critical analyses; and (h) experiential learning individually and collectively.

Prospective sector(s):

- Electric and electronic industries,
- E-waste Recycling Unites,
- Private entrepreneurs,
- Environmental consultancies,
- Pollution Boards, and
- Environmental NGOs

Suggested Readings:

- Hester, R.E. and Harrison, R.M., 2009. Electronic Waste Management: Design. Analysis and Application. Royal Society of Chemistry Publishing. Cambridge, UK.
- Fowler, B.A., 2017. Electronic Waste: Toxicology and Public Health Issues. Academic Press.
- Gaidajis, G., Angelakoglou, K. and Aktsoylou, D., 2010. E-waste: environmental problems and current management. Journal of Engineering Science and Technology Review, 3(1), pp.193-199.
- Janyasuthiwong, S., 2020. Metal Removal and Recovery from Mining Wastewater and E-waste Leachate. CRC Press.

Examination scheme and mode:

Evaluation scheme and mode will be as per the guidelines notified by the University of Delhi.