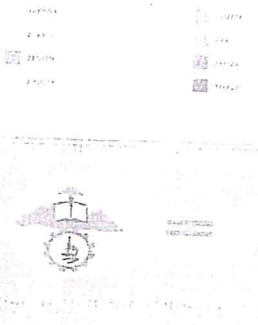

Debre Berhan University

College of Social Sciences and the Humanities

Department of Geography and Environmental Studies

Curriculum for the MSc Degree in Environment and Sustainable Development

(Specializations in Environmental Management, Climate Change Management, and Sustainable Development)

April, 2016

DebreBerhan

1. Background of the Program

The Earth has entered a human-dominated epoch, the Anthropocene. Humanity is overwhelming and degrading the Earth's life support systems on which all life depends. Problems with respect to environment, climate change, and sustainable development are globally recognized challenges and the most critical issues of our time. Continued dependence on non-renewable sources of energy is unsustainable and faces increasingly unacceptable trade-offs for local, regional and global environment and climate change. The environment and climate is undergoing irreversible changes that raise stark questions of justice.

Tackling these challenges requires a strong commitment from academia, government, NGOs, industry, and private sectors. Professionals, managers, and policy makers require knowledge to understand the interconnectedness of economic, environmental and social dimensions, and competencies to manage and contribute the change towards a more sustainable world.

This MSc program in Environment and Sustainable Development explores the science of environmental problems, anticipated impacts, and sustainable solutionsfora sustainabledevelopment. The program is focused on understanding processes, both natural and anthropogenic, which have contributed to contemporary environmental problems and which threaten to transform the economy in sustainable manner.

In the light of the above, the Master of Science in Environment and Sustainable Development will prepare the next generation of multidisciplinary professionals to address the imposing challenges posed by environment and climate change while undertaking development. Students can develop a firm grasp of environmental, climate change and development science and the potential impacts of environmental problems in this century and beyond. Besides, they can gain both a high level of knowledge in particular aspects of environmental/climate change

management, and a broad knowledge of the modern approaches of sustainable development. Students will also develop their analytic skill in practice and focused manner.

The graduates of this Master's program will,therefore, play an important role in shaping and contributing to the critical environmental and climate change management capacity building efforts, such as provide professional and leadership on the country's effort in environmental conservation and management, climate change adaptation and mitigation, carbon financing, climate and energy policy making, and largely on Climate Resilient Green Economy (CRGE) development, etc.

2. Rational for Launching the MSc Program inEnvironment and Sustainable Development

Environment,climate change, and sustainable developmentare at the forefront of teaching and research on sustainable solutions to local, national and global socio ecological-economic problems. There is a pressing national and international need to understand the nature and consequences of environment and climatic change and to develop strategies to respond to it.

Thus, the MScdegree in Environment and Sustainable Development provides an in-depth look at environment, climate change, and sustainable development imparting the knowledge that is needed for graduates planning to work in areas of environmental, climate change and sustainable development.

More specifically, this MSc program is designed to produce highly qualified professionals in environmental management, climate change management, and sustainable development to contributeto Ethiopia's effort inClimate Resilient Green Economy (CRGE) development, and support the globalsustainable development goals (SDGs). The program aims at producing graduates who are equipped with theories, practice, tools, skills and perspectives for enhancedrolein building a sustainable Ethiopian economy. This program is designed for social, natural, agricultural, development, economics, business, and physical science graduates

wanting an advanced academic qualification as a launch pad for careers in environment, climate change, and sustainable development by government,private industry, and NGOs.

It is worth mentioning that the Ethiopian Government is seriously looking at environment, climate change, development sustainabilityissuesin its development and transformation plan like that of theCRGE development strategy. In the light of this, the Government has opened related fields in higher education institutes; established ministries for examplethe Ministry of Environment, Forest and Climate Change, the Ministry of Agriculture and Natural Resources, the Ministry of Water, Irrigation and Energy; the Ministry of Finance and Economic Development; the Ethiopian Metrological Service Agency which has branches at region, zone and Woreda levels; and research Institutes, such as the Environment, Forest and Climate Change Research Institute, the Ethiopian Agricultural Research Institute, the Ethiopian Development Research Institute, and etc. Therefore, the launching of this MSc program at DebereBerhan University is timely applicable, the Ethiopian Government has already set the issue in its development and transformation priority agenda.

In order to know the demand for professionals of environment and sustainable development (environmental management, climate change management, and sustainable development) in the country, need assessment study was carried out by the committee formed to design the MSc curriculum. Data was collected from theFederal Government Institutions, Regional Institutions, International Research Institutes, and Non-Governmental Organizations. The major organizations included in the study were theMinistry of Environment, Forest and Climate Change, the Minister of Agriculture and Natural Resources, Meteorological Service Agency, Ethiopian Institute of Agricultural Research (EIAR),Universities, Amhara Region Bureau of Environment and Land administration, Amhara Region Bureau of Agriculture, Amhara Regional Agricultural Research Institute (ARARI), GIZ, Organization for Rehabilitation and Development in Amhara (ORDA), Amhara Region Disaster Preventionand Food Security Coordination Office, Ethiopian Development Research Institute, the International Food Policy Research Institute, Water and Land Resources Center (WLRC), and others. The survey result has shown that the

man power demand of the country in the field of environment and sustainable development (with specializations in environmental management, climate change management, sustainable economic development), is very high. It is found to be clear that the country has been facing a shortage of well-trained manpower in the proposed area to achieve the country's SDGs. Majority of the surveyed organizations were found to be employ practitioners or professionals with related fields for the area.

Respondents were asked to point out their interest to employ environment and sustainable development (environmental management, climate change management and sustainable development) professionals in the years to come. Accordingly, they were reported that they will employ 102,173, 256 environment and sustainable development MSc graduates (with the aforementioned specializations)in the coming 5, 10 and 15 years, respectively. Besides, 73% of the respondents replied that they are willing to sponsor their staffs to study MSc degree in Environment and Sustainable Development. The respondents also revealed thatthe program shouldbefocused and practicebased to develop graduates analytical skills.

3. Objectives of the MSc Program in Environment and Sustainable Development

The overall objective of the MSc Program in Environment and Sustainable Development is to contribute to Ethiopia's Climate Resilient Green Economy Development and the global sustainable development effort by training professionals in the field. The Program seeks to provide graduate students with advanced skills in theories, field practice, and techniques.

The specific objectives of the program are to:

- produce internationally competent professionals in environment and sustainable development who can work as educators, researchers, development workers, leaders, and policy makers.

- produce experts capable of policy advice related to environment, climate change, and sustainable economic development.
- produce qualified and skilled professional who can play active role in conservation and management of the natural resources and the environment for sustainability under the changing climate.
- produce experts who can provide advisory services for implementing, monitoring and evaluating sustainable development programs in Ethiopia and elsewhere.
- found center of excellence for environment, climate change and sustainable development academics, research and community service to contribute to Ethiopia's Climate Resilient Green Economy through teaching, research, and outreach.

4.Profiles

4.1 Professional profile

The proposed MSc program in Environment and Sustainable Development is expected to develop professionals who

- Work as an academicians and researchers in higher learning institutes and research centers.
- Involve in policy advice in environmental, climate change and sustainable development.
- Engage in consultancy of environment, climate change and sustainable development areas.
- Leadenvironment friendly and climate change smart sustainable development projects.
- Engage in national and international networks relevant to their academic and professional interests
- Involve in the governance of carbon,climate change and environmental related issues to limit emissions and other management issues while undertaking CRGE development.
- Work as self-employed consultantsrelated to their academic and professional competency.

4.2 Graduate profiles

After the completion of the MSc Program in Environment and Sustainable Development,the graduates will be able to:

- Demonstrate an understanding of key issues relating to environment, climate change and sustainable economic development issues at local, regional and global scales.

- Be familiar with carbon auditing methodologies, as well as the tools used for environmental and climate change impact assessment, adaptation strategies, and mitigation mechanisms.
- Play leading role in environment, climate change and development related multidisciplinary study that would maximize Climate Resilient Green Development strategies and policies.
- Capable of consulting policy makers in formulating appropriate Climate Resilient Green Development strategies and policies.
- Critically understand driversof environmental, climate change and sustainable developmentproblems.
- Identify, analyze and develop holistic solutions to problems associated with environmental, climate change and sustainable development.
- Be involved in training in environmental, climate change, carbon management, and development projecttechniques and mechanisms at various levels.
- Be engaged in monitoring of sustainable development projects.
- Analyse environmental, climatic and socio-economicdata for sustainable development.
- Work on community based sustainable development projects.
- Provide professional services in universities, colleges, and research centers, and NGOs.
- Involve in private consultancy services and thus create employment opportunities for others.

4.3. Prospective Employment Opportunities

Graduates from the MSc program in Environment and Sustainable Development could find excellent employment opportunities in Universities, Research Institutions, Government Ministries (e.g. Ministry of Environment, Forest and Climate Change, Ministry of Agriculture and Natural Resources, Ministry of Water, Irrigation and Energy), NGOs, and self-employed (e.g. carbon management plan, environmental impact assessment, environmental management plan, develop environmentally friendly projects, and etc.).

No	Name	Qualification	Specialization	Remark
1	Alemu Assele	MA	Remote sensing, GIS & digital cartography	Active
2	Ali Gebeyehu	MA	Remote sensing and GIS	Active

4.4 Staff Profile

3	Aragaw	BA	Geography and Environmental Studies	Active
5	DesalegnYayeh	PhD	Physical Geography (climate change)	Active
6	Dodge Getachew	MA	Urban &regional development planning	Active
7	GetamesayTefera	MSc	Population, Environment and Development	Active
8	GetinetTeshome	MSc	Sustainable Natural Resource Management	Active
9	GatahunAgumass	MSc.	Geo-Information science	Active
10	HailemariamBirke	PhD	Social Ecology (Energy, Environment and Development)	Active
11	EmishawGirma	MA	Environmental & Development	PhD study leave
12	FikaduMengistu	MA	Environment & Development	PhD study leave
13	AragawAlemayehu	MA	Physical Geography (Natural Recourse and Environment Management)	PhD study leave
14	EphremTegegn	MA	Urban & Regional Planning	PhD study leave
15	GebreTafere	MA	Physical Geography (Natural Recourse and Environment Management)	PhD study leave
16	SiyumMelese	MA	Environmental Science	PhD study leave
17	AdugnaEndalew	MA	Human Geography (Tourism& development)	PhD study leave
18	WendesenAbera	MA	Natural Resource and Environment management	PhD study leave
19	GebeyawSitotaw	MA	Water recourse engineering and management	PhD study leave
20	MeazaGetachew	MA	Physical Geography (land management)	PhD study leave

4.5 Resources

For this MSc program we have planned to use resources available in the Department of Geography and Environmental studies (for example the GIS and Remote Sensing Lab) and also resources available in other Department of in the University (such as Soil and water labs). In

addition, it will use resources available in DebreBerhan Agricultural Research Center. Furthermore, we have planned to open a new postgraduate resource center that will include GIS and RS lab, and soil and water lab.

5. Unique Features of the Program

5.1. Contribute to Sustainable Solutions

This MSc program is developed to produce professionals to contribute to the design and actors of the sustainable solutions needed to achieve an environmentally and socially accountable society while undertaking development and or transformation processes. Candidates will learn how to analyze the processes associated with change and will consider the short and long term management of these processes at local, national and global levels.

5.2. Multidisciplinary Perspective

This MSc program is designed for candidates who want to study and solve societal sustainability issues from a multidisciplinary perspective. The program combines social, natural, agricultural, economics, business, and physical science approaches to the study of environment and climate change, its causes and effects, and how can we manage it while undertaking development in a sustainable manner. The program is of particular interest to candidates who are willing to broaden their perspectives through collaboration and interaction with students who bring to the program knowledge of other natural and social science disciplines.

5.3. Specialize in one of the Three Tracks

Following admission to this MSc's program and after successfully completing the courses given during first year-first semester, candidates can choose one of three specialization tracks based on their interests in the field from the beginning of first year-second semester. In case of research, candidates can work in relation to research themes in their chosen track as well as in other tracks when it is found to be needed. The specializationsare Environmental Management, Climate Change Management, and SustainableDevelopment.

5.3.1. Environmental Management (EM)

Design and greater implementation of solutions to current issues of environmental concern requires skilled professionals capable of working within, between and across disciplines. This specialization track provides the necessary multidisciplinary training and is relevant to those concerned with the management of the environment and the formulation and implementation of policies that create environmental improvements at different levels, such as local, national and global levels.

Theenvironmental management specialization gives students the scientific background to deal with environmental problems, and an understanding of social, economic, and policy issues that guide solutions to these problems through systematic, multidisciplinary, and cross-cutting approaches to the critical environmental problems of our time.

5.3.2. Climate Change Management (CCM)

The climate change management specialization is an essential component of environment and sustainable development. Factors such as carbon emission and unsustainable use of resources for socio-ecologic metabolic processes are jeopardising both the stability of current climate and socio-ecological systems and the evolution of future systems.

This specializationtrack is designed to lay comprehensiveknowledge toclimate change management in resolving or mitigatingenvironmental problems in the socially, economic and ecologic spheres, but with a strong climate change focus. It provides high-level knowledge and skills in the science of climate change management for academia,environmental managers and policy makers in public, private and not-profit making organizations.

5.3.3. Sustainable Development (SD)

Following the conventional development path would, among other adverse effects, result in a sharp increase in GHG emissions, unsustainable use of natural resources,and widespread environmental degradation, which is eroding the natural capital on which human wellbeing depends. Therefore, the transition to a sustainabledevelopment, or a development that is environmentally sustainable, has become a political and socio-economic imperative in the 21stcentury. The transformation to a sustainableeconomic development represents a substantial challenge to society, particularly in the current era of rapid environmental and socio-economic change.

Ethiopia aims to achieve middle-income status by 2025 while developing a green economy. The Government has developed a strategy to build a green economy, CRGE development strategy. DebreBerhan University, as a responsible body from the academia, is now highly working to transform the strategy into action by producing highly skilled professionals in this area.

Thus, this sustainable development specialization seeks to provide the scientific understanding on which the transition to a green economy can be based, including the principles of environmental sustainability and the societal responses required to implement these in policy and also in practice.

6. Required Courses, Course List and Descriptions

6.1. Required Courses and Assignment of Course Code

The program of study leading to MSc Degree in Environment and Sustainable Development extends for one academic year of full time course work and one more year for thesis writing. Extending beyond two years requires the permission of the Department and the program coordinator/chairperson.

Each semester runs for 16 weeks, giving a total of ***38 credit hours***: 31 credit hours course work, 1 credit hours seminar, and 6 credit hours thesis work. The MSc programconsists offour modules, namely: basic and research module, environment module, climate module, and development module.

The courses are coded with four letters and four digits. The four letters abbreviation (ENSD) shows that EN stands for Environment and SD for Sustainable Development. The first number of the code (6 or 7) represents the years of study; the second number represents the category of the module as basic and research module (1), environment module (2) climate module (3), and development module (4); the third indicates the course number in the module and; the last number represents the semester. For courses given both in first and second semesters, the last number is 0, an example to this is thethesiswork needed to fulfill the MSc degree requirement.

6.2. Module, Course List, Code, and Credit Hours

No	Module	Code	Course title	Cr hr
1	Basic and	ENSD6111	Environment and Sustainable Development	3
		ENSD6121	Modeling Socio-Ecological Systems Interaction	3

	Research	ENSD6131	Natural Resources Management	3
		ENSD6141	Research Methods in Environment and Sustainable Development	3
		[illegible]	[illegible]	[illegible]
		ENSD6262	Environmental Impact Assessment	2
		ENSD7171	Development Project Design and Management	2
		ENSD7181	Graduate Seminar	1
		ENSD7190	MSc Thesis	6
2	Environment	ENSD6212	Environmental Pollution and Management	3
		ENSD6222	Land Degradation and Management	3
		ENSD6232	Ecosystem and Biodiversity Conservation	3
		ENSD6242	Environmental Economics and Policy	3
3	Climate	ENSD6312	Advanced Climatology and Climate Modeling	3
		ENSD6322	Terrestrial Carbon Cycle Modeling and Auditing	3
		ENSD6332	Climate Change Impacts, Adaptation and Mitigation	
		ENSD6342	Climate Economics and Policy	3
4	Development	ENSD6412	Development Theories	3
		ENSD6422	Green Economy Development	3
		ENSD6432	Political Economy of the Environment	3
		ENSD6442	Policy Analysis and Design for Sustainable Development	3

6.3. Semester Based Course Breakdown by Specialization Tracks

6.3.1. Environmental Management (EM)

No	Module	Code	Course title	Cr hr
1	Year I Semester I	ENSD6111	Environment and Sustainable Development	3
		ENSD6121	Modeling Social-Ecological Systems Interaction	3
		ENSD6131	Natural Resources Management	3
		ENSD6141	Research Methods in Environment and Sustainable Development	3
		ENSD6151	GIS and RS for Environment and Sustainable Development	3
Total				15
2	Year I Semester II	ENSD6212	Environmental Pollution and Management (soil, air, water)	3
		ENSD6222	Land Degradation and Management	3
		ENSD6232	Ecosystem and Biodiversity Conservation	3
		ENSD6242	Environmental Economics and Policy	3
		ENSD6262	Environmental Impact Assessment	2
Total				12
	Year II Semester I	ENSD7171	Development Project Design and Management	2
		ENSD7181	Graduate Seminar	1
		ENSD7190	MSc Thesis	6
Total				9
	Year II Semester I	ENSD7190	MSc Thesis (Continuation from Year 2-semester I but will not register again)	6*
Total				6
Grand Total				38

6.3.2. ClimateChange Management (CCM)

No	Module	Code	Course title	Cr hr

1	Year I Semester I	ENSD6111	Environment and Sustainable Development	3
		ENSD6121	Modeling Social-Ecological Systems Interaction	3
		ENSD6131	Natural Resources Management	3
		ENSD6141	Research Methods in Environment and Sustainable Development	3
		ENSD6151	GIS and RS for Environment and Sustainable Development	3
Total				15
3	Year I Semester II	ENSD6312	Advanced Climatology and Climate Modeling	3
		ENSD6322	Terrestrial Carbon Cycle Modeling and Auditing	3
		ENSD6332	Climate Change Impacts, Adaptation and Mitigation	3
		ENSD6342	Climate Economics and Policy	3
		ENSD6362	Environmental Impact Assessment	2
Total				12
	Year II Semester I	ENSD7171	Development Project Design and Management	2
		ENSD7181	Graduate Seminar	1
		ENSD7190	MSc Thesis	6
Total				9
	Year II Semester II	ENSD7190	MSc Thesis (Continuation from Year 2-semester I but will not register again)	6*
Total				6
Grand Total				38

6.3.3. Sustainable Development (SD)

No	Module	Code	Course title	Cr hr
1	Year I Semester I	ENSD6111	Environment and Sustainable Development	3
		ENSD6121	Modeling Social-Ecological Systems Interaction	3
		ENSD6131	Natural Resources Management	3
		ENSD6141	Research Methods in Environment and Sustainable Development	3
		ENSD6151	GIS and RS for Environment and Sustainable Development	3
Total				15
2	Year I Semester II	ENSD6412	Development Theories	3
		ENSD6422	Green Economy Development	3
		ENSD6432	Political Economy of the Environment	3
		ENSD6442	Policy Analysis and Design for Sustainable Development	3
		ENSD6162	Environmental Impact Assessment	2
Total				14
3	Year II Semester I	ENSD7171	Development Project Design and Management	2
		ENSD7181	Graduate Seminar	1
		ENSD7190	MSc Thesis	6
Total				9
4	Year II Semester I	ENSD 7190	MSc Thesis (Continuation from Year 2-semester I but will not register again)	6*
Total				6
Grand Total				38

6.3.2. ClimateChange Management (CCM)

No	Module	Code	Course title	Cr hr
1	Year I Semester I	ENSD6111	Environment and Sustainable Development	3
		ENSD6121	Modeling Social-Ecological Systems Interaction	3
		ENSD6131	Natural Resources Management	3
		ENSD6141	Research Methods in Environment and Sustainable Development	3
		ENSD6151	GIS and RS for Environment and Sustainable Development	3
Total				15
3	Year I Semester II	ENSD6312	Advanced Climatology and Climate Modeling	3
		ENSD6322	Climate Change Impacts, Adaptation and Mitigation	3
		ENSD6332	Environment and Development Policy Analysis	3
		ENSD6342	Environmental Impact Assessment	2
Total				11
		ENSD7190	MSc Thesis	6
Total				6
	Year II Semester II	ENSD7190	MSc Thesis (Continuation from Year 2-semester I but will not register again)	6*
Total				6
Grand Total				32

6.4. Course Description

The detail course outlines of the courses given in the program will be prepared by respective professor who is going to give the courses. Here, the courses are described in terms of the major focuses that may be included in each course.

Course title: Environment and Sustainable Development

Course code: ENSD6111

Aim

The aim of this course is to gain familiarity with cutting edge debates linking environment and sustainable development. A subsidiary aim is to equip students with a critical understanding of the sustainable development theoretical debate and practice, unveiling the political, social and economic forces underlying environmental and development problems, and exploring concrete approaches to address their causes.

Course description

This course examines alternative conceptions and theoretical underpinnings of the notion of "sustainable development." It focuses on the sustainability problems of industrial countries (i.e., aging of populations, sustainable consumption, institutional adjustments, etc.); and of developing states and economies in transition (i.e., managing growth, sustainability of production patterns, pressures of population change, etc.).

This course examines the interface between development and environmental issues at local, national, regional and global contexts. The theoretical and material linkages between environment and development processes and the multiple dimensions of sustainability and their conflicts and contradictions, are discussed. This is done within the framework of analyzing the discourse for sustainable development, which has emerged on the international political agenda as the dominant approach for reconciling the goals of economic development, environmental quality and social equity. The course is divided into two parts. The first part of the course focuses on the different theoretical perspectives of development and environment and the various debates on how to achieve sustainability of development and environment. This part explores whether the goals of ecological sustainability and the sustainability of

economic growth can be achieved together, and how global capitalism, poverty and ecological issues are interrelated. In the second part the course covers major environmental issues, such as climate change, water security, food security and biodiversity, health, rural and urban sustainability within the context of saving the Earth from ecological collapse and bringing about sustainable futures for humanity.

Course title: Development Theories

Course code: ENSD6412

Aim

This course is aimed to provide a critical overview of different development theory. It will critically examine development thinking and its evolution over time. So that students will have an opportunity to apply these ideas in a more practical and problem-oriented way in their career.

Course description

This module critically examines the major approaches and theories that dominate thinking about development at present, and have done so in the past several decades. The course adopts a multidisciplinary approach, discussing contributions by development-oriented scholars. In reviewing different theoretical paradigms, the basic understanding is that each theory is embedded in a particular historical and societal context that inspires useful insights but also imposes certain limitations. No theoretical school has a definitive answer to the problems of development, while on the other hand several key ideas persist or recur in different guises as newly formulated theoretical insights.

The following schools of development thinking will be discussed: dualism, orientalism and the persistence of dichotomies in development thinking; modernization theories viewing development as a unilinear process; the dependencia school and political-economy approaches; neoliberalism and globalization as a development paradigm; (new) institutional approaches to development and the role of the state; postmodernism, post-development and actor-oriented approaches; Sen's capabilities approach and the purpose of development; sustainable

development and its critics; social theories of development and the rule of culture; ethical approaches in development, complexity theory and development.

Course title: Ecosystem and Biodiversity Conservation

Course code: ENSD6232

Aim

The aim of the course is to provide a critical and conceptually sophisticated understanding of ecosystem and biodiversity science and the socio-economic, political, cultural and institutional environments, within which management and policy decisions are made.

Course description

This course examines the roles played by the biosphere in global and local environmental change, both in how it is affected by environmental change and in how changes in the biosphere can affect environmental change. The course commences with a macro-scale view of global biosphere function in Earth history and the global impact of humanity, putting contemporary environmental change into wider context. It then explores the linkages between biodiversity and ecosystem services before showing how ecologists explore the responses of the biosphere to global change through field studies, satellite remote sensing and modelling, focussing on examples from contemporary research in tropical, subtropical and temperate biomes. Emphasis is placed on management for the conservation of biodiversity. Students are first taught the basic principles or ecosystem management before being shown more detailed examples of management activities in a range of terrestrial ecosystems including grasslands, arable systems, heath lands woodlands and wetlands. In the final part of the course students discuss emerging topics in ecosystem management such as the adaptation of conservation management methods in a changing climate.

This course will also equip students with a critical understanding of the science underpinning biodiversity conservation imperatives at local and on the global stage. Within the course we examine key biodiversity conservation approaches to the analysis of biodiversity, and to predictive modeling of biodiversity losses consequent upon human action. In addition to this

applied content, we take a critical look at biodiversity science, focusing on problems of scale, uncertainty and scientific practice. Throughout, students will examine key assumptions and uncertainties within the science of biodiversity at a range of scales from the local to global.

Course title: Advanced Climatology and Climate Modeling

Course code: ENSD6312

Aim

The course is aimed to provide comprehensive training in understanding, modeling and prediction of atmospheric/climatic processes; as well as the collection, management, supply and application of climate/atmospheric data for the needs of a variety of scientific purposes.

Course description

This course will start with an overview of the present climate system including its components, their interactions, and the processes that drive the general circulation that we observe today. Basic radiation laws, atmospheric dynamics, contemporary climate issues, and oscillations in the climate system will be reviewed.

This course also equip students with climate change modeling and climate projections, scenarios and probabilistic projections, and associated issues involved in their application, overview of tools for use in climate change studies. These may include global circulation models, regional climate models, biophysical models and socioeconomic models, decision support tools to inform decision making and how to handle multiple trade-offs, early warning systems, tools used in strategic planning to integrate mitigation and adaptation in developing resilient economy to climate change, and statistical techniques that are currently in use to identify contemporary climate variability and change.

Course title: Terrestrial Carbon Cycle Modeling and Auditing

Course code: ENSD6322

Aim

The aim of the course is to model and audit the terrestrial ecosystems carbon cycle in a consistent manner with the energy flows in order to safeguard sustainable development of the coupled carbon-climate human system.

Course description

Climate change is often quoted as the major challenge facing the world's population in the 21st Century. The course first explores the science of climate change. Students will learn how the climate system works; what factors cause climate change at different timescales and how these factors interact; how climate has changed in the past and changing in the future; and the possible consequences of climate change.

Then the course looks at the connection between climate change and human activity in relation to the global carbon cycling. The cycling of carbon between the atmosphere, biosphere and oceans is a key concept in climate change. The coupling between climate change and carbon cycling is explored in this course and will begin with an overview of the topic by introducing the concepts of weather, climate and climate change. Finally, the course assesses the role carbon cycling management plays to manage CO_2 emission. Thus, the course supplies different approaches for carbon management and /or sequestration.

Course title: GIS and Remote Sensing for Environment and Sustainable Development

Course code: ENSD6151

Aims

This course aims to provide an applied introduction to the use of GIS and RS in the environment and sustainable development areas. The course will cover the underlying concepts of spatial data and its analysis and will offer extensive hands-on experience of GIS and RS as applied to

practical problems and research questions in environment and sustainable development. The course will also introduce students to a wide range of published GIS and RS applications.

Course description

The GIS and RS course commences with an introduction to the concept of GIS and RS and explores the range of software options available to undertake GIS and analyse remotely sensed data. The course provides a foundation in cartography, coordinate systems and data types. The course also progresses through a range of data integration, data management and analytical procedures to provide a hands-on experience of the application of GIS and RS to solve environmental and climate problems for a sustainable development. It will introduce several satellite images that can be used as sources of data for environmental analyse and for climate change monitoring. More specifically, the course will cover: principles of cartography; coordinate systems and projections; types and sources of spatial data; Raster and vector data; GIS software and capabilities; Integration and organisation of spatial data in a GIS; satellite imageries used for environment and climate change analysis and monitoring; Georeferencing and image analyses; Spatial analyses in GIS; 3D visualisation and data presentation; and application of GIS and RS.

Course title: Climate Change Impacts, Adaptation and Mitigation

Course code: ENSD6332

Aim

The aim of the course is to give a solid understanding of climate change impacts, and provide the knowledge and tools to devise effective and cost-effective strategies for climate change adaptation and mitigation on a global, national and at local scales.

Course description

Climate Change Impacts, Adaptation and Mitigation is an interdisciplinary course. The course draws on diverse fields ranging from economics to international relations and energy systems analysis. We examine climate change from an international perspective, with emphasis placed

on both the developed and the developing countries. The course opens with a brief review of the latest scientific findings, the most recent developments in climate change policy, and an overview of common tools that analysts use to examine the climate question. We then devote roughly half of the term to examining climate change impacts and adaptation and half to mitigation. In looking at impacts and adaptation, we examine social and biophysical vulnerabilities to environmental change and explore the policies and measures that have been proposed to minimize the impacts of climate change. In examining mitigation, we discuss technological options, policies, and socioeconomic impacts of mitigative measures. The course has a mixed lecture-discussion format. Participation during discussion is strongly encouraged and is incorporated in student evaluations. The focus of the course is climate change impacts and the human response to climate change, including efforts to adapt to climate change, as well as efforts to avoid or reduce the negative impacts of climate change.

Course title: Environmental Impact Assessment

Course code: ENSD6262

Aim

The aim of this course is to introduce the methodology of environmental impact assessment (EIA) as a vital tool for sound environmental management and decision-making.

Course Description

This course is designed to introduce students to Environmental Impact Assessment (EIA). The course provides an overview of the concepts, methods, issues and various forms and stages of the EIA process. It examines the development of EIA overseas and in Ethiopia. Different levels and systems of EIA are examined to highlight the diversity of approach and impact of the EIA process. In general, this course has five parts. The first part covers basic concepts related to EIA and Strategic Impact Assessment (SIA) including environment, environmental impact and inventory, and also the historical origin of EIA. The second part focuses onlegal frameworks of EIA (policy, social and institutional framework); principles of EIA; EIA and sustainable development; the need for EIA; and responsible bodies in EIA processes. The third part covers

the basic steps in EIA process: site suitability analysis, project description, baseline data collection and analysis, impact identification and assessment, impact prediction and evaluation; environmental impact analysis, mitigation measures identification, environmental management and monitoring plan preparation, EIA report reviewing and auditing. The fourth part focuses on the use of remotely sensed data (satellite imageries) and the application of different softwares particularly GIS, Definite DEMO and ERDAS IMAGINE for EIA and SIA. The last part covers application of EIA in a given development projects such as in agriculture, construction, road projects, water projects, factories, fish farm, flower farms, animal farm, industries, etc.

Course title: Research Methods in Environment and Sustainable Development

Course code: ENSD6141

Aim

The aim of the course is to build scientific perspective and attitude for scientific enquiry by creating knowledge and understanding of scientific explanation, elements of research design and quantitative and qualitative techniques used in environment and sustainable development.

Course description:

This course has two parts: research methods and statistical analysis part. The first part covers the types of research based on application, objective of the investigation, purpose of study; research problem identification; writing research proposal; components of a research proposal; scientific report writing; ethics in scientific report writing; presentation of research results. The second part covers statistical methods used in environment and sustainable development analysis. More specifically, this part focuses upon advanced statistical tools for spatial analysis and modeling; Chi-square; analysis of variance (ANOVA); T-test; Bi-variate and multivariate analysis; correlation and multiple regression techniques; trend analysis; Manwhetny test; Wilcoxon test; Kruskal Wallis test and other nonparametric methods. Analysis of covariance, Contingency tables, non-parametric statistics, etc.

Course title: Development Project Design and Management

Course code: ENSD7171

Aim

The aim of this course is build students capacity to design, plan, implement, analysis, monitor, evaluate and reviewa development project. it aiso aims at anaiyzing the benefits and costs of undertaking a project and leads to the selection of the most promising project through appropriate selection and appraisal techniques.

Course description:

DevelopmentProject Design and management represent a set of core skills and competencies required for students who wish to work as professional in the field of development projects. In that context, this course is designed to help students develop those skills for professional practice with an emphasis on grant proposal writing, evaluation plan development, and professional presentations. Theory around the nature of participation, the mechanics of social change, and the measurement of change will be discussed to provide context for and strengthen the application of the practical skills that form the core of the course.The theoretical tools of project analysis are discussed, explains how to apply quantitative analysis of costs and benefits to evaluate projects from multiple perspectives financial and economic. Secondly it aims to develop skills of project planning and management in providing the basic services. This means the aspects of financing and managing projects and working out modalities of cost recovery. Thirdly the course deals in principles of project management like organization of projects, financial management, human resource management, evaluation and reporting of the project activities, maintaining the planned time, cost and quality of project during implementation and networking of the project with other parties.

Course title: Graduate Seminar

Course code: ENSD7181

Aim

This is an interdisciplinary graduate seminar aimed to introduce and inspire innovative research and cross-cutting issues on the environment, climate change and sustainable development from the local to global perspectives, through a combination of secondary source readings and independent research.

Course description

Students will write a manuscript and present a seminar on selected topics related with Current environmental, climate change and development related topics. The topics will be in line with the program research thematic areas and will be chosen by the student, course teacher and student advisor(s). The manuscript will be presented at a seminar where graduate students and staff members of the Department as well as other interested individuals are available.

Course title: MSc Thesis

Course code: ENSD7190

Aim

The Master's thesis is a piece of scholarly research giving students an opportunity to apply the knowledge and skills they have acquired during the first year of the master´s program and the bachelor studies. The Master´s degree thesis is aimed to demonstrate the candidate's capacity for independent scientific work and his/her academic competence.

Course description

Students will write a thesis on selected topics related with environment, climate change and development issues. The topics of the thesis should be in line with the thematic area of the department and selected by the student and will be approved by the post graduate thesis

committee and their respective advisor(s). Thesis proposals will be written and consequently approved by the post graduate examining committee at an open defense. After conducting the research work, the thesis should be defended at an open defense for final evaluation. In the thesis research project, the student should demonstrate skills in formulating main and secondary research questions, and in planning, conducting, analysing and reporting on an interesting issue, applying theories and understanding and in doing qualitative and quantitative field work. It should demonstrate the student's ability to identify and analyse scientific challenges, and to communicate effectively and efficiently across world view boundaries.

The thesis must provide a detailed and substantiated account of the thematic, methodological and theoretical basis for the work. It must elaborate on the importance of the research question or hypothesis and the value of the research to the scientific community. The empirical material under analysis will be presented in a clear manner, also showing the links to the theoretical framework and the methodology employed. Last but not least, the thesis work will follow the basic principles of research ethics.

Course title: Climate Economics and Policy

Course code: ENSD6342

Aim

The course is aimed to provide an understanding of climate change issues, especially the economics of climate change. It is also aimed to provide the tools to assess the relative merits of various climate change policies that will increasingly be put forward by governments and other stakeholders.

Course description

The course investigates the economic aspects of climate change and the economics of climate policy from local to global perspectives. The course starts with a brief introduction to the concept of efficiency and optimality in welfare economics. It then defines the concepts of

externalities, public goods, property rights, and market failure. Pollution control instruments are first described in general terms and then with particular focus on the use of tax incentives and marketable permits to control emissions of greenhouse gases. The analysis of policy frameworks also includes considerations regarding uncertainty and technological progress. The overall mitigation problem is addressed using the methodological framework provided by cost effectiveness and cost-benefit analysis. In this context the issue of choosing the appropriate social discount rate is discussed. The final part of the course addresses specific issues related to global climate change: the role of energy prices, transition to renewable energy and the situation and role of developing countries. The latter includes ethical principles underlying equity and environmental justice considerations in a North-South perspective. The course briefly assesses recent and current climate policy events. The current status of international climate change negotiations is discussed. And also, Climate change policy is discussed in relation to the green economy paradigm.

On completion of this course students should be able to describe and articulate some of the key issues relating to climate change and demonstrate knowledge of what economics can offer to policies aimed at mitigating its effects. Students should understand the role of economic instruments in designing appropriate climate change policies, and the issues of climate change from both developed and developing country perspective.

Course title: Environmental Economics and Policy

Course code:ENSD6242

Aim

This course is aimed to develop strong policy and economic skills and their use in the analysis of environmental and resource stewardship, while providing flexibility to incorporate interests in environmental issues. Particularly, it is aimed to introduce the broad principles of economic reasoning in relation to environmental problems and solutions; to illustrate how economics and

policy can help explain the causes of current environmental problems, and to describe how economics and policy can be used to mitigate environmental damage.

Course description

This course provides an economic perspective on the management of environmental resources. Conceptual topics include environmental externalities, market failure, public goods, sustainability, and benefit-cost analysis. Emphasis will be on the use of economics and policy in understanding and solving environmental problems.

Environmental Economics and Policy course will equip students with economic methods and tools to analyze basic environmental issues. This course also combines theoretical analysis with discussions on specific environmental policies as applied to different components of the environment. Within those topics, particular topics that will be covered are the concepts of sustainability, microeconomic analysis of environmental regulation, the problem of social cost, policy instrument choice, and estimating costs and benefits of environmental improvements via revealed preferences or stated preferences. This course will also cover selected topics in the economics and politics of environmental and resource policy.

At the end of the course students will understand the importance of economic motives in all aspects of human life and will be familiar with constructing economic arguments, be able to explain environmental degradation in economic terms, possess the tools to evaluate policy interventions aimed to environmental conservation in terms of their costs and benefits, and be able to critically comment on current environmental policy issues.

Course title: Modeling Socio-Ecological Systems Interaction

Course code:ENSD6121

Aim

This course investigates both disciplinary and interdisciplinary approaches that are important to understanding connections and linkages across social and ecological realms. This course is therefore aimed to provide models and theoretical/conceptual frameworks for understanding of complex social-ecological systems interaction in order to improve the scientific basis of students for sustainable development.

Course description

Social-ecological systems (SESs) are nested, multi-level interlinked systems of humans and nature that provide essential resources to society such as food, fiber, energy and water. The course will cover the building blocks for systemic/dynamic understanding of social-ecological systems, with giving an emphasis on the biophysical perspectives and on social perspectives. Different socio-ecological approaches will be integrated and consider what these include and attend to, and what remains sidelined. The course will provide students different models and an in –depth analysis of coupled SESs with a specific focus on the SES framework developed by different scholars, school of thoughts and institutes. The course will guide students in the exploration of how the concepts of social-ecological systems compare to other scientific approaches to studying human-environment interactions. This comparison will be based on reading of assigned literature, student-led presentations, case studies and a facilitated group discussion.

Course title: Natural Resources Management

Course code:ENSD6131

Aim

The aim this course is to familiarize students with contemporary issues in natural resources assessment and management. It is also aimed to enhance the knowledge of students to integrate knowledge in natural science, social science, policy, and economics to advance the sustainable management of natural resources.

Course Description

This course introduces key theories and concepts that will help students to interpret and engage with current issues and debates around the management of natural resources. To achieve these students will initially explore how certain social constructs, such as property rights, affect how our resources are managed. This is followed by an exploration of basic ecological and physical principles that are critical to understanding current natural resource issues—both within Ethiopia and around the world. This social and ecological/physical knowledge is then applied to an exploration of how different natural resources (e.g., water, land and forest) are managed (including through policy and legislation). In detail, the course deals with definition of concepts in natural resources management, objectives and principles of natural resources management, resource degradation and depletion, resource use conflicts and conflict management, trans-boundary resources, natural resource governance, integrated natural resources management, community based natural resources management, natural resources policies, and management regimes and practices.

Course title: Environmental Pollution and Management

Course code: ENSD6212

Aim

This course is aimed to give the training to develop the particular skills required to improve the understanding of the students about different sources of environmental pollution, types environmental pollutants and pollution control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments i.e. air, water and soil.

Course description

With the increasing industrialization and developmental activities, more and more pollutants are entering to the soil, water and air, thereby polluting these environmental components. Therefore, this course focuses up on soil, water and air pollution and integrated waste

management system. The first part, environmental management and pollution control strategies focuses up on environmental indicators, pollution prevention methodologies, methods for waste minimization, types of recycling, recycling of waste material, recovery effort index, ISO standards, and environmental audits. The second part covers air pollution and control: introduction to air pollution and atmospheric diffusion, general ideas in air pollution control and alternative control measures. The third part will cover soil pollution and control: soil contamination by chemical pollutants: sources and fate. Remediation by plants, bioremediation by microorganisms; contamination by inorganic (including heavy metals) and organic pollutants; factors affecting uptake of contaminants, prevention and elimination of contamination; landfills.Effects of atmospheric deposition on various types of soils, cation exchange capacity (CEC) of soils. The fourth part covers water pollutants and control: it deals with surface and ground water pollution and its sources, and different water pollution controlling techniques.

Course title: Land Degradation and Management

Course code:ENSD6222

Aim

The aim of this course is to develop students' assessment skills of land degradation, its management and analyze its impacts on sustainable societal development.

Course description

Land is a very valuable and scarce resource. People need land to grow food, to build cities, for investments as well as for housing. Therefore, access to land, rights over land, the management and administration of land as well as the settling of land conflicts are very important for human kind. Many international conventions and declarations underline the importance of land rights and land management to achieve sustainable rural and urban development. Land degradation is an issue of much concern today especially in developing countries because it affects the productivity of land resources on which socio-metabolic transition depend. This course exposes

the student to concepts of land degradation, forms of land degradation, its causes and consequences of land degradation. It will also introduce students to various approaches in studying land degradation management approaches. The course combines theory and practice. Students are trained in the application of practical methods and tools. Case studies, field trips and lectures given by experts with practical experience complete the formation.

Course title: Green Economy Development

Course code:ENSD6422

Aim

This course aimed to teach students about the different dimensions and concepts driving the global green economy.

Course description

The development of a green economy is gathering global attention as nations undertake new economic development strategies that take into account social, environmental and economic dimensions. The implementation of an economy that is environmentally sound and sustainable is becoming a socio- economic and political necessity and an imperative. This course will address the various dimensions, challenges, and opportunities permeating the global green economy, paying heed to the key drivers of the global green economy. In addition, the course also showcases the Ethiopian green economy development progress.

Students also will be exposed to global and national opportunities and challenges permeating the adoption of renewable energy use, and a low carbon and inclusive green economy. Additionally, the student will learn how to develop and apply basic knowledge and skills related to the green economy.

Course title: Political Economy of the Environment

Course code:ENSD6432

Aim

This course aims to teach students the global political economy, with a specific focus on the environment. It focuses on the ways in which international economic processes shape global environmental governance.

Course description

Global environmental governance has become a key term in environmental and resource politics. The environment has traditionally been approached from an institutional angle in international politics. The concept of governance helps to show how broader global political forces and trends shape environmental politics. Global environmental governance describes world politics that go beyond states as actors to include other actors such as multinational corporations, international organizations, civil society groups and networks of experts and local communities. While the concept of global environmental governance allows us to capture this multiplicity of actors, environmental governance is not a uniform political process. The course also analyzes the theory and practice of "sustainable development" with a focus on the role of international financial institutions, transnational corporations, civil society organizations and trade agreements among nation states. The course will consist of two main components: the first is a general introduction situating environmental issues within the arena of political economy and a review of key concepts within the fields of economics and the environment, and the second is case-study and thematic investigations focusing on population, poverty, social movements, fair trade, energy, and international policy-making. The specific topics may include (1) the environmental consequences of current patterns of consumption, (2) the effect of international trade on global environmental issues, (3) the influence of foreign direct investment on environmental regulation, (4) the compatibility of environmental protection and economic growth, (5) whether current understandings of sustainable development are tenable, and (6) the effect of development finance on the environment, etc.

7. Rules, Regulations and Requirements

Rules, regulations and requirements for this program will strictly follow Debre Berhan University's Senate Legislation requirements.

7.1. Duration of the Study

The MSc program is a two-year program, first year (two semesters) dedicated for taught coursework, second year firstsemester dedicated for some coursework, project work, seminar, research proposal writing, data collection, while second year second semester is dedicated for research write ups, thesis submission, thesis defense, and graduation. Nevertheless, in conditions when students could not finish on time and present solid reasons, the duration of study may be extended up to a maximum of four years. Such extension of time shall be recommended by the DGC and approved by the SC/DC every semester.

7.2. Admission Requirements

The regular requirements for admission into MScDegree in Environment and Sustainable Development are a B.A/BSc/BEd in any one of the following fields of studies; Geography and Environmental Studies, Development and Environmental Management Studies, Natural Resource Management, Forestry, EnvironmentalScience, Chemistry, Biology, Plant Science, Soil Science, Economics, Accounting, Management, and other related fields or an equivalent degree in a related field of study from a recognized university. Related fields admitted to the program may be required to take some prerequisite courses that will be identified by the Environment and Sustainable Development Graduate Committee.

Admission will be granted to applicants on the basis of a sound undergraduate academic record, and a convincing statement of purpose which clearly describes their academic interest in the program and intended area of research. In addition, admission is contingent on fulfilling other requirements requested by the post graduate office of the university and must pass the prepared entrance examination to join the program.

7.3. Medium of Instruction

As it is prescribed in the Federal Democratic Republic of Ethiopia Ministry of Education the medium of instruction for the program will be English.

7.4. Graduation Requirements

A candidate must satisfy the following to qualify for the award of the MSc Degree in Environment and Sustainable Development in DebreBerhan University:

- Complete a minimum of 31 credit hours of course work
- Attain a minimum CGPA (cumulative grade point average) of 3.00 on a 4-point scale.
- Score a maximum ofone C grade in all courses, and no D and F grades in any course.
- Write a thesis which must be defended in an open defense where the examining board (an internal and external examiner) is involved, and the rating MUST be 'Excellent', 'Very good', 'Good', or 'Satisfactory'.
- Then, the thesis should be bound and approved by advisor, examiners, and chair person.
- Fulfill university wide graduation requirements

7.5. Degree Nomenclature

The MSc degree to be awarded upon successful completion of the program shall be designated as:

In English: MSc Degree in Environment and Sustainable Development
(Specializations in Environmental Management, Climate Change Management, and Sustainable Development).

In Amharic:የሳይንስማስትሬትድግሪበአካባቢናዘላቂልማት (በአካባቢማናጅመንት፣ በአየርንብረትለውጥማናጅመንትእናበዘላቂልማት)

8. Assessment and evaluation

Graduate student progress is assessed regularly and formally by the program through assigned supervisors. The assessments focus on both completion of coursework and the development of professional skill in research, scientific writing and service through the following methods.

- Class attendance and participation
- Assignments and projects (seminars, term papers, laboratory/field work reports)
- Presentation
- Mid-term examinations
- Final examination
- Quality of thesis work and presentation

Examinations are graded on the following letter grading system with corresponding points.

Raw Mark Interval	Letter Grade	Grade Point
95-100	A+	4.00
90-95	A	4.00
85-90	A-	3.75
80-85	B+	3.50
75-80	B	3.00
70-75	B-	2.75
65-70	C+	2.50
58-65	C	2.00
50-58	C-	1.75
40-50	D	1.00
<40	F	0.00

Thesis defense examination:

- Manner of presentation (25%)
- Confidence in the subject matter (25%)
- Ability of answering question (50%)
- Total (100%).

Evaluation result: Excellent (A), Very Good (B+), Good (B), Satisfactory (B-), and Fail (C)

Evaluation weight: advisor (50%), external examiner (35%), and chairperson (15%).

A Thesis that is defended and accepted may be rated "Excellent", "Very Good", "Good" or "Satisfactory" which may appear on the transcript but will not be used for calculation of the CGPA of the student.A rejected thesis shall be rated "Fail".

9. Monitoring and Evaluation, and Quality Assurance

Performance of the program will be monitored regularly by the DGC, through its regular meetings, and an overall evaluation of achievements and problems will be undertaken parallel with the ongoing program. It is hoped that the students will provide important feedback as to their original expectations and experiences in passing through the program. Evaluations of the courses and instructors will be conducted at the end of each semester. Open discussion will be made with students and traces assessment will be conducted to evaluate the courses on the relevance, contribution to the overall program, provision of academic challenges and students' satisfaction. Based on the comments the content of the course will be modified; new course can be added and appropriate improvements will be made.

Employers of graduates and other relevant stakeholders will also be contacted and provide feedback on the performance of graduates.

The quality of the program will also be maintained at the highest standard possible by periodically reviewing the curriculum and the teaching methodology, in reference to similar

Debre Berhan University

Program: Geography and Environmental Studies

***MASTER OF ARTS* (MA) in**

Urban Development and Management

Oct, 2017

include social discrimination, low self-esteem, poor nutrition, economic backwardness, lack of security, etc. To advert this, there is need for proper planning of urban areas and the need to initiate urban renewal plans as well as the promotion of sustainable development.

5.0 SUMMARY

In this unit, you have learnt about the concept and definitions of urbanisation and urban poverty; causes and effects of urbanisation and urban poverty; strategies for planning the expanding urban areas, including application of policies and regulations. You have also learnt about urban renewal programme, structural economic development and urban planning for sustainable development. In the next unit, you will learn about the use of geographic information system (GIS) in urban planning and management. It is hope that the knowledge you have gained in previous units will assist you learn how to apply GIS in urban planning.

6.0 TUTOR-MARKED ASSIGNMENT

1. a) Define sustainable development?
   b) Explain the concern being expressed as regard the exploitation of environmental resources with recourse to sustainable development in Nigeria.
   c) Describe how you educate members of the public on the importance of sustainable development in your community.
2) a) Define absolute and relative poverty.
   b) List five causes and five effects of poverty.
   c) How will you eradicate poverty in your community?

7.0 REFERENCES/FURTHER READING

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