

# Division of Biochemistry, School of Life sciences, JSSAHER, Mysuru

JSS Medical Institution Campus  
S. S. Nagar, Mysuru



**Education for Sustainable Development Goals**

**TEACHING AND LEARNING OBJECTIVE HANDBOOK**



## Education for Sustainable Development Goals

### Teaching & Learning Objective Handbook

By 2030, ensure that all learners acquire knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non- violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development.

[Source: United Nations, 2015](#)

## FOREWORD



The Sustainable Development Goals (SDGs) introduced in the year 2015 is a follow up of the Millennium Development Goals (MDGs) implemented in 2000. It is a vital framework, which calls attention to meet the challenges towards creating a sustainable future with an impressive target of “Leaving No One Behind”. Achievement of SDGs calls for collective efforts of stakeholders from Government, Non-governmental organizations, Higher Educational Institutions, Multi-national agencies, Civilian organizations, and Public.

While the countries around the globe are seriously addressing several issues on the way towards achieving the SDGs, it is becoming evident that

these goals cannot be achieved in complete if the younger generation are not made aware of the goals. The best possible means of reaching the youth is through the curriculum, either in schools or in universities. The United Nations has called upon the countries to incorporate the SGDs into the existing curriculum, aligning the teaching and learning aspects in line with the goals. JSS Academy of Higher Education & Research has emerged as a renowned institute in the country by providing quality education of highest standards through innovation in academic and research activities even during the most difficult times, for instance, the recent pandemic. JSS AHER has initiated the task of educating students and staff on the SDGs by incorporating the goals into the existing curriculum. Under the able guidance of the HEI, School of Life Sciences is committed to contribute towards achieving the SDGs through its multi-disciplinary academic excellence, research, innovation, environmental protection, and inclusiveness. Since its inception, the School of Life Sciences has seen an exponential growth in a short span of time due to the unique programs, which are being offered in five departments and eight divisions, keeping in mind the problems of the society. The school sees that most of the activities are closely aligned with the vision of sustainable development goals. The programs are designed to address the issues of the society pertaining to water, health, food, and environment. The school stands today as a unique institution in the country known for multidisciplinary and interdisciplinary teaching and research in Life Sciences. We have attempted to identify potential courses that can be aligned to the tune of SDGs in the curriculum across the syllabi, which were recently revised according to the NEP 2020.

I take this opportunity to express my sincere gratitude to the leadership of JSS Academy of Higher Education & Research for their constant support and cooperation towards all our initiatives. I thank all the faculty members both teaching and non-teaching for having contributed towards a noble cause of achieving the SDGs through Education

## Preface



In recent days, several challenges, such as educational inequality, climate changes, and social challenges faced by human being have been increasing. Those challenges should be overcome through transforming education which consider the sustainable development goals.

Sustainable Development Goals (SDGs) also known as “The Global Goals for Sustainable Development are a collection of 17 global goals designed to be a blueprint for achieving a better and more sustainable future for all. They address the global challenges we face, including poverty, inequality, climate change, environmental degradation, peace, and justice. The SDGs, set in 2015 by the United Nations General Assembly and intended to be achieved by the year 2030.

Higher education and research department are the most significant indicators of a national progress which gives an impact for economic growth. Therefore, higher education is able support SDGs by producing high quality and highly competitive human resources. Universities are part of higher education that also support SDGs. This is due to the people who achieved good education, especially in universities, have clear knowledge about environmental and SDGs. Biochemical science and education in universities is a combination treatment utilized for supporting SDGs; zero hunger, nitrogen fertilization, and some biological treatments have been successfully supporting SDGs. Biological science supports education for sustainable development, as we can see, biological science and education support SDGs especially on good health and well-being, responsible consumption and production. For instance, the Plant Biochemistry has been successfully utilizing the biology community for nitrogen fertilization, as it can overcome various problems of soil changes by using protist communities.

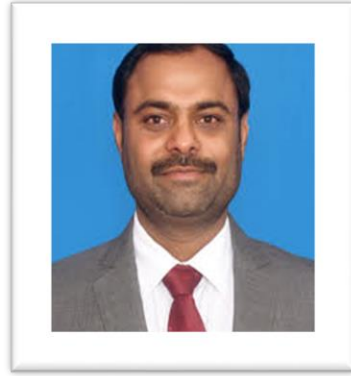
Biochemistry has been developing in every aspect in our life. Biochemistry discusses about epigenetic which link genetic to the disease issues. It informs that epigenetic mechanisms that maintain cell identities during an individual’s development and throughout its life. Biochemistry education could support sustainable development goals (SDGs). To end the hunger, biology education and science can assure the food security. Thus, a more-efficient animal production and meat substitutes are needed. Biochemistry education and science ensure healthy lives by utilizing the development of biological medic to distribute required diagnostic, therapeutic drugs to treat Diseases and developing education quality.

**Coordinator,  
Division of Biochemistry,  
School of Life Sciences  
JSS Academy of Higher Education & Research, Mysuru**

## CONTRIBUTIONS



Dr. Raghuram Achar



Dr. Siddesha J M



Dr. Shiva S



Dr. D Gurukumar

### **Teaching Faculty**

Division of Biochemistry, School of Life Sciences  
JSS Academy of Higher Education & Research, Mysuru

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## INTRODUCTION

The Sustainable Development Goals – an ambitious and universal agenda to transform our world. On 25 September 2015, the UN General Assembly adopted the 2030 Agenda for Sustainable Development (UN, 2015). This new global framework to redirect humanity towards a sustainable path was developed following the United Nations Conference on Sustainable Development (Rio+20) in Rio de Janeiro, Brazil in June 2012, in a three-year process involving UN Member States, national surveys engaging millions of people and thousands of actors from all over the world.

At the core of the 2030 Agenda are 17 Sustainable Development Goals (SDGs). The universal, transformational and inclusive SDGs describe major development challenges for humanity. The aim of the 17 SDGs is to secure a sustainable, peaceful, prosperous, and equitable life on earth for everyone now and in the future. The goals cover global challenges that are crucial for the survival of humanity. They set environmental limits and set critical thresholds for the use of natural resources. The goals recognize that ending poverty must go together with strategies that build economic development. They address a range of social needs including education, health, social protection, and job opportunities while tackling climate change and environmental protection. The SDGs address key systemic barriers to sustainable development such as inequality, unsustainable consumption patterns, weak institutional capacity, and environmental degradation.

For the goals to be reached, everyone needs to do their part: governments, the private sector, civil society and every human being across the world. Governments are expected to take ownership and establish national frameworks, policies, and measures for the implementation of the 2030 Agenda.

A key feature of the 2030 Agenda for Sustainable Development is its universality and indivisibility. It addresses all countries – from the Global South and the Global North – as target countries. All countries subscribing to the 2030 Agenda are to align their own development efforts with the aim of promoting prosperity while protecting the planet to achieve sustainable development. Thus, with respect to the SDGs, all countries can be considered as developing and all countries need to take urgent action.

## **The 17 Sustainable Development Goals (SDGs)**

No Poverty – End poverty in all its forms everywhere

Zero Hunger – End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Good Health and Well-Being – Ensure healthy lives and promote well-being for all at all ages

Quality Education – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Gender Equality – Achieve gender equality and empower all women and girls

Clean Water and Sanitation – Ensure availability and sustainable management of water and sanitation for all

Affordable and Clean Energy – Ensure access to affordable, reliable, sustainable, and clean energy for all

Decent Work and Economic Growth – Promote sustained, inclusive, and sustainable economic growth, full and productive employment and decent work for all

Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Reduced Inequalities – Reduce inequality within and among countries

Sustainable Cities and Communities – Make cities and human settlements inclusive, safe, resilient and sustainable

Responsible Consumption and Production – Ensure sustainable consumption and production patterns

Climate Action – Take urgent action to combat climate change and its impacts

Life below Water – Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Life on Land – Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Peace, Justice and Strong Institutions – Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Partnerships for the Goals – Strengthen the means of implementation and revitalize the global partnership for sustainable development



Source: <http://www.un.org/sustainabledevelopment/sustainable-development-goals>





**SDG 2 - Zero Hunger**



**End hunger, achieve food security and improved nutrition and promote sustainable agriculture**

**Teaching & Learning objectives for SDG 2 “Zero Hunger”**

<p>Subject/ topic/ course in regular curriculum relating to SDG 2</p>	<ul style="list-style-type: none"> <li>• Nutritional Biochemistry</li> <li>• Nutrition</li> </ul>
<p>Cognitive Teaching &amp; learning objectives</p>	<p><b>At the end of the first unit,</b></p> <ul style="list-style-type: none"> <li>• The learner knows about Concept of nutrition, essential nutrients and their classification.</li> <li>• The learner is acquainted with essential terminology associated with nutrition.</li> </ul> <p><b>At the end of the second unit,</b> The learner should be able to:</p> <ul style="list-style-type: none"> <li>• Describe the roles of carbohydrate in the body.</li> <li>• Identify food sources containing carbohydrates.</li> <li>• Explain the factors that constitute a high-quality carbohydrate.</li> <li>• Briefly describe the process of carbohydrate digestion and absorption.</li> <li>• Outline the process of carbohydrate metabolism.</li> <li>• Define and describe glycemic index.</li> <li>• List several benefits of a high-fiber diet.</li> <li>• List various types of carbohydrates and their effect on athletic performance, weight management, and overall health.</li> </ul> <p><b>At the end of the third unit,</b></p> <ul style="list-style-type: none"> <li>• List the functions of fat in the body.</li> <li>• Describe the difference between saturated fat, unsaturated fat, and trans fat.</li> <li>• Outline the process of fat digestion, absorption, and storage.</li> <li>• Describe the effect of various fats on health and disease risk.</li> <li>• Describe the effect of fat intake on performance.</li> </ul>

	<ul style="list-style-type: none"> <li>• List several principles to share with clients when discussing fat intake.</li> </ul> <p><b>At the end of the fourth unit,</b></p> <ul style="list-style-type: none"> <li>• Define the term micronutrient and explain the different categories of micronutrients.</li> <li>• Describe the role of electrolytes in athletic performance.</li> <li>• List the micronutrients most commonly deficient in athletes.</li> <li>• Describe the benefit or lack of benefit of vitamin and mineral supplementation.</li> <li>• Explain the importance of water for health and athletic performance.</li> </ul> <p><b>In general, the course aims to provide the following.</b></p> <ul style="list-style-type: none"> <li>• Nutrition and malnutrition and their main physical and pathological effects on human life, and about specific vulnerable groups.</li> <li>• The amount of different nutrients and their beneficial effects and also malnutrition locally, nationally and globally, currently as well as historically.</li> <li>• Main drivers and root causes for hunger at the individual, local, national and global level.</li> <li>• Need for different micro and macro nutrients to combat hunger and malnutrition worldwide and knows about other strategies to combat hunger, malnutrition and poor diets</li> </ul>
Socio-emotional Teaching & learning objectives	<ul style="list-style-type: none"> <li>• The learner can communicate on the issues and connections between combating hunger and promoting sustainable complete diet and improve the health and wellness.</li> <li>• The learner can create a vision for a world without hunger and malnutrition.</li> <li>• The learner can reflect on their own values and deal with diverging values, attitudes, and strategies in relation to combating malnutrition related disorders and promoting sustainable diet plan for the healthy life</li> <li>• The learner can feel responsibility, and solidarity for and with people suffering from malnutrition.</li> </ul>
Behavioural Teaching & learning objectives	<ul style="list-style-type: none"> <li>• The learner can evaluate and implement actions personally to combat malnutrition and to promote healthy life style..</li> <li>• The learner can evaluate, participate in and influence decision-making related to required dietary allowance for the malnutrition and the promotion of sustainable human growth and Development.</li> <li>• The learner can take on active role as an global citizen in the challenge of malnourishments.</li> <li>• The learner can change their Diet plan and practices in malnourish peoples in order to contribute to the combat against hunger and the promotion of sustainable Diet plan.</li> </ul>

## Suggested topics for SDG 2 “Zero Hunger”

Definition of the concept of hunger and malnutrition

Groups that are particularly vulnerable to malnutrition

Main drivers and root causes of hunger and malnutrition, including the relation between climate change and food security and the depletion of soil quality

Consequences of hunger and malnutrition on the health and well-being of people,

Physical, emotional and socio-cultural functions of food Hunger in relation to

food abundance, obesity and food waste

Global food – import, export, cash crops, international taxes, subsidies, trading systems, merits, risks and challenges of malnourishment.

Institutions and movements related to malnourishment and their effects on human growth.

Concepts and principles of sustainable diet plan for all age groups.

Diversity of different diet with ethnicity.

## Examples of learning approaches and methods for SDG 2 “Zero Hunger”

Perform role-plays with complete nutrition.

Carry out scenario development and analysis of different diet plan.

Carry out case study analyses of adequate and non-adequate nutrition in different age groups.

Follow food from farm to fork – growing, harvesting and preparing food, e.g.

Engage students in efforts to connect leftover food with people in need Conduct a Life

### SDG 3 - Good Health and Well-being



Ensure healthy lives and promote well-being for all at all ages

#### Teaching & Learning objectives for SDG 3 “Good Health & Well being”

Subject/ topic/ course in regular curriculum relating to SDG 3	<ul style="list-style-type: none"> <li>• Clinical Biochemistry</li> <li>• Biochemical Basis of Diseases</li> </ul>
Cognitive Teaching & learning objectives	<p>The aim of this course is to demonstrate how basic biochemistry and analytical chemistry can be applied to medical diagnosis, treatment, and management.</p> <p><b>At the end of the first unit, the learner will be able to</b></p> <ul style="list-style-type: none"> <li>• learn about different clinical disorders, the biochemical consequences of particular disease processes, and the response to therapy.</li> <li>• assess human physiology using biological fluid.</li> </ul> <p><b>At the end of the second, third, and fourth unit, the learner will be able to</b></p> <ul style="list-style-type: none"> <li>• illustrate the mechanism of metabolic disorders at the molecular level thereby facilitating employability in diagnostic and research institutes.</li> </ul> <p><b>In general the course aims to fulfill the following learning outcomes:</b></p> <ul style="list-style-type: none"> <li>• The learner knows conceptions of health and disease</li> <li>• The learner knows facts and figures about the most severe communicable and non-communicable diseases, and the most vulnerable groups and regions concerning illness, disease, and premature death.</li> <li>• The learner understands the importance of mental health. The learner understands the negative impacts of behaviours like xenophobia, discrimination and bullying on mental health and emotional well-being and how alcohol, tobacco or other drugs cause harm to health and well-being.</li> <li>• The learner knows relevant prevention strategies to foster positive physical and mental health and well-being, including reproductive health and their diagnosis and information as well as early warning and risk reduction.</li> </ul>
Socio-emotional Teaching & learning objectives	<ul style="list-style-type: none"> <li>• The learner can communicate about issues of health, including reproductive health, and well-being</li> <li>• The learner can encourage others to decide and act in favour of promoting health and well-being for all.</li> <li>• The learner can develop a personal commitment to promoting health and well-being for themselves, their family, and others, including considering healthy life style and frequent diagnosis during diseases condition.</li> </ul>
Behavioural Teaching & learning objectives	<ul style="list-style-type: none"> <li>• The learner can include health promoting behaviours in their daily routines.</li> <li>• The learner can plan, implement, evaluate, and replicate strategies that promote health, including reproductive, and mental health.</li> <li>• The learner has the capacity to perceive when others need help and to seek help for themselves and others.</li> </ul>

## Suggested topics for SDG 3 “Good Health and Well-being”

Define : Severe communicable and non-communicable diseases

Health problems of vulnerable groups and in the most vulnerable regions, and an understanding of how diagnosis is important for the better treatment.

Direct strategies to promote health and well-being, e.g. vaccines, healthy food, physical activity, mental health, medical consultation, education, reproductive health education including education about pregnancy.

Indirect strategies (public health) to promote health and well-being, drug prevention, transfer of knowledge and technology, reduction of pollution and contamination, early warning and risk reduction

Philosophical and ethical conceptions of life quality, well-being, and happiness

Discriminatory attitudes towards people living with HIV, other illnesses, or mental disorders

Overweight and obesity, insufficient physical activity, and unhealthy food

Chemicals, greenhouse gases, pollution and contamination of air, water, and soil

## Examples of learning approaches and methods for SDG 3 “Good Health and Well-Being”

Set up an information stand in the city, e.g. on “World AIDS Day” (December 1)

Watch videos that show health promoting behaviours (e.g. saying “No” to drug offers)

Participate in ethical, reflective essay writing and/or discussions about what a life of health and well-being means

Engage with storytelling by people with severe diseases, drug addictions, etc.

Organize training on health promotion and illness prevention strategies (e.g. participating in physical activities, preparing healthy food, installing a mosquito net, detecting and managing sources of waterborne diseases)

Conduct projects epidemic and endemic disease – success vs. challenges (Corona , Malaria, Zika, Ebola, etc.)

Develop an enquiry-based project, ‘Is living longer a good thing?’

## SDG 9 - Industry, Innovation and Infrastructure



Build infrastructure, promote inclusive and sustainable industrialization and foster innovation

### Teaching & Learning objectives for SDG 9 “Industry, Innovation and Infrastructure”

Subject/ topic/ course in regular curriculum relating to SDG 9	<ul style="list-style-type: none"> <li>• Biochemical techniques</li> <li>• Analytical Biochemistry</li> </ul>
Cognitive Teaching & learning objectives	<p>In this course, learners will be able to demonstrate methods for purifying proteins, and analyzing biological molecules by electrophoresis, Western blotting, and enzyme activity assays.</p> <p><b>At the end of the first and second units, the learners will be able to</b></p> <ul style="list-style-type: none"> <li>• Understand the crucial separation techniques for implementation of research ideas at molecular level.</li> <li>• adopt various techniques in biological research.</li> </ul> <p><b>By the end of the third unit, the learner will be able to</b></p> <ul style="list-style-type: none"> <li>• understand the use of radioactivity in biological research</li> <li>• get acquainted with staining techniques used in biochemical research.</li> </ul> <p><b>In general, by the end of the course, the learners would be able to</b></p> <ul style="list-style-type: none"> <li>• understand the basic principles of various biochemical techniques.</li> <li>• understand separation and characterization of biomolecules using different chromatographic methods, electrophoretic methods and blotting techniques.</li> <li>• understand the optimization of various techniques.</li> <li>• use these techniques for the development of industrial infrastructure.</li> <li>• significantly enhances their employability in Biotechnological, Pharmaceutical Industries and Analytical Laboratories and research institutes.</li> </ul>
Socio-emotional Teaching & learning objectives	<ul style="list-style-type: none"> <li>• The learner can adopt these techniques to build small diagnostic laboratories. This results in making individual self-sustainable and serving for the benefit of people.</li> <li>• The learner can find collaborators to develop most advanced (innovative) analytical techniques that further boost up the development of industries.</li> <li>• This creates sustainable job market, opportunities to young people and open the door for investments.</li> </ul>
Behavioural Teaching & learning objectives	<ul style="list-style-type: none"> <li>• The learner can connect with other industrial partner to develop innovative technologies that can adopt to develop pharmaceuticals/drugs that can be used for the benefit of people/society.</li> <li>• The learner is able to start their own startups (small-scale industries) and they can access financial services such as loans or microfinance to support their own enterprises.</li> <li>• The learner can evaluate various forms of industrialization and compare their resilience. Further, they can think towards the development of sustainable infrastructure.</li> </ul>

## Suggested topics for SDG 9 “Industry, Innovation and Infrastructure”

The sustainability of information and communication technology (ICT) including supply chains, waste disposal and recycling

The relation of quality infrastructure and the achievement of social, economic and political goals

The need for basic infrastructure like roads, information and communication technologies, sanitation, electrical power and water

Inclusive and sustainable innovation and industrialization

Sustainable and resilient infrastructure development

Sustainable electricity: national grids, feed-in tariffs, expanding sustainable renewable sources, conflicts

The sustainable job market, opportunities and investments

The sustainability of the internet – from green chat groups to the ecological footprint of search-engine servers

The sustainability of transport infrastructure

Alternative currencies as investment in local infrastructure

## Examples of learning approaches and methods for SDG 9 “Industry, Innovation and Infrastructure”

Role-play a day without access to electricity

Develop a business continuity plan for a local enterprise after the impact of a natural hazard

Develop an energy descent action plan for your community

Develop a vision for a world with fossil fuel free transport systems

Develop a project exploring one form of either the physical or social infrastructure that underpins your community

Engage students and young people in developing spaces for community get-togethers

Develop an enquiry-based project: “Is all innovation good?”



## SDG 12 - Responsible Consumption and Production



Ensure sustainable consumption and production patterns

### Teaching & Learning objectives for SDG 12 “Responsible Consumption and Production”

Subject/ topic/ course in regular curriculum relating to SDG 12	<ul style="list-style-type: none"> <li>• Protein Chemistry and Technology</li> <li>• Proteomics</li> </ul>
Cognitive Teaching & learning objectives	<p><b>This course aims to provide the students with</b></p> <ul style="list-style-type: none"> <li>• an introduction to current methodologies and trends in the field of proteomics.</li> <li>• an overview and awareness of typical proteomics applications both from lectures and an introduction to proteomics lab work.</li> </ul> <p><b>Upon successful completion of this course, students will be able to</b></p> <ul style="list-style-type: none"> <li>• Understand the advantages and disadvantages of proteomics over wet lab experimental methods with emerging technologies.</li> <li>• Participate in scientific discussions regarding proteomics technologies critically</li> <li>• Understand the strategies in protein engineering and its applications in the production and consumption of protein supplements.</li> <li>• Understand the value of protein isolation, characterization, mass production, and consumption.</li> <li>• Identify the physical basis for protein denaturation and its stability and its effect on the production and consumption of protein-rich food products.</li> <li>• Develop strategies and practices of various protein stabilizers and their applications in sustainable production and consumption.</li> <li>• understand the process of making protein isolates and concentrates, and factors affecting the quality of isolates and concentrates that are necessary for achieving sustainable consumption and production.</li> </ul>
Socio-emotional Teaching & learning objectives	<ul style="list-style-type: none"> <li>• The learner can communicate the need for sustainable practices in the production and consumption of protein isolates and concentrates.</li> <li>• The learner can encourage others to engage in sustainable practices in protein consumption and production.</li> <li>• The learner can differentiate between the needs and wants of protein isolates and concentrates and reflect on their own individual consumer behavior considering the needs of the natural world, other people, cultures and countries, and future generations.</li> <li>• The learner can envision artificial peptide synthesis and their applications in sustainable production and consumption.</li> <li>• The learner can learn the importance of engineering of peptide-based therapeutics and antibiotics.</li> </ul>
Behavioural	<ul style="list-style-type: none"> <li>• The learner can plan, implement and evaluate consumption-related activities</li> </ul>

Teaching & learning objectives	<p>using existing sustainability criteria in peptide-based therapeutics and antibiotics.</p> <ul style="list-style-type: none"> <li>• The learner can evaluate, participate in and influence decision-making processes about production and consumption of protein isolates and concentrates.</li> <li>• The learner can promote sustainable production patterns.</li> <li>• The learner is able take on critically on their role as an active stakeholder in the market</li> </ul>
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### Suggested topics for SDG 12 “Responsible Consumption and Production”

Advertising, peer-pressure, belonging and identity-creation

Production and consumption history, patterns and value chains, and management and use of natural resources (renewables and non-renewables)

Environmental and social impacts of production and consumption

Energy production and consumption (transport, commercial and residential energy use, renewable energies)

Food production and consumption (agriculture, food processing, dietary choices and habits, waste generation, deforestation, overconsumption of food and hunger)

Tourism

Waste generation and management (prevention, reduction, recycling, reuse)

Sustainable lifestyles and diverse practices of sustainable production and consumption

Labelling systems and certificates for sustainable production and consumption

Green economy (cradle-to-cradle, circular economy, green growth, degrowth)

### Examples of learning approaches and methods for SDG 12 “Responsible Consumption and Production”

Calculate and reflect on one’s individual ecological footprint

Analyse different products (e.g. cell phones, computers, clothes) using Life Cycle Analysis (LCA)

Run a student company producing and selling sustainable products

Perform role plays dealing with different roles in a trading system (producer, advertiser, consumer, waste manager, etc.)

Screening of short films/documentaries to help the learners understand production and consumption patterns (e.g. *Story of Stuff* by Annie Leonard)

Develop and run a (youth) action project related to production and consumption (e.g. fashion, technology, etc.)

Develop an enquiry-based project: “Is sustainability about giving things up?”

## SDG 15 - Life on Land



Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

### **Teaching & Learning objectives for SDG 15 “Life on Land”**

Subject/ topic/ course in regular curriculum relating to SDG 15	<ul style="list-style-type: none"> <li>Plant Biochemistry</li> </ul>
Cognitive Teaching & learning objectives	<p><b>The course aims to</b></p> <ul style="list-style-type: none"> <li>provide information on the physiological processes of plant at molecular level.</li> <li>explain the biochemical and cellular aspects of photosynthesis, respiration, and other special functions of plants.</li> </ul> <p><b>At the end of all the units, the learners will</b></p> <ul style="list-style-type: none"> <li>appreciate the functioning of plants by specialized molecular processes.</li> <li>extrapolate this knowledge for their research work.</li> <li>understand plant cell structure, organization, and apply specific biochemical functions to all compartments of the plant cell</li> <li>learn the structure, function and biosynthetic pathways of essential biochemical molecules including their key chemical and physical properties.</li> <li>learn amino acid structures and relate their chemical properties to the synthesis and function of proteins and enzymes.</li> <li>understand protein structural hierarchy and relate structure to function.</li> </ul>
Socio-emotional Teaching & learning objectives	<ul style="list-style-type: none"> <li>The learner can argue scientifically stating the biochemical perspectives against destructive environmental practices that cause biodiversity loss.</li> <li>The learner can connect with their local natural areas and feel empathy with non- human life on Earth.</li> <li>The learner can question the dualism of human/nature and realizes that we are a part of nature and not apart from nature.</li> <li>The learner can create a vision of a life in harmony with nature.</li> </ul>
Behavioural Teaching & learning objectives	<ul style="list-style-type: none"> <li>The learner can connect with local groups working toward biodiversity conservation in their area.</li> <li>The learner can effectively speak on topics related to permeability to wildlife through the establishment of wildlife corridors, agro-environmental schemes, restoration ecology and more.</li> <li>The learner is able to highlight the importance of soil and water as our growing material for all food and the importance of remediating or stopping the erosion of our soils.</li> </ul>

## Suggested topics for SDG 15 “Life on Land”

Ecology: competition, predator-prey, community dynamics, energy flow through food webs, dispersal and ranges. Specific ecosystems – local and global native ecosystems and also human-made ones, e.g. managed forestry plantations

Threats to biodiversity: habitat loss, deforestation, fragmentation, invasive species and overexploitation (caused by unsustainable production and consumption practices, unsustainable technologies, etc.)

The dangers of extinction: Individually endangered species, how extinction is forever, the long time needed to form species, and the six mass extinctions

Restoration of wildlife and seeing humans as a healing force

Climate change and biodiversity, ecosystems as carbon sinks, disaster risk reduction and ecosystems (ecosystems as a natural barrier to natural hazards)

Soil and its formation and structure

Desertification, deforestation and efforts to combat them

The human’s connection with nature – the natural self

Ecosystem services (cultural, provisioning, regulatory and supporting)

Evolution and genetics, genetic resources, ethics

## Examples of learning approaches and methods for SDG 15 “Life on Land”

Map the local area, mark areas of various wildlife populations as well as barriers, such as dispersal barriers like roads and invasive species populations

Perform an annual day when the community comes together to map as many different species in their area as possible

Run a composting workshop and show organic material formation

Take an excursion to a nearby parkland for cultural purposes, e.g. recreation, meditation, art

Plant a wildlife garden for wild animals, e.g. bee-friendly flowers, insect hotels, ponds, etc. in urban areas

Celebrate Earth Day and/or World Environment Day

Develop an enquiry-based project: “Why is biodiversity important?”

## CONCLUSIONS

Institution & individual can contribute to achieving the SDGs by developing cross-cutting sustainability competencies that are needed to deal with many different sustainability challenges and to relate the different SDGs to each other. Institution can equip learners with the specific cognitive, socio-emotional and behavioural learning outcomes that enable them to deal with the particular challenges of each SDG.

To make it possible for everyone around the world to take action in favour of the SDGs, all educational institutions must consider it their responsibility to deal intensively with sustainable development issues, to foster the development of sustainability competencies and to develop the specific learning outcomes related to all SDGs. Therefore it is vital not only to include SDG-related contents in the curricula, but also to use action-oriented transformative pedagogy.

Education officials, policy-makers, educators, curriculum developers and others are called upon to rethink education in order to contribute to the achievement of the SDGs within their timeframe, between now and 2030. This guidance provides an orientation to the sustainability competencies and specific cognitive, socio-emotional and behavioural learning outcomes that are relevant to this goal, and it outlines what is needed to implement learning for the SDGs through Educational Institutions.

### Education for Sustainable Development Goals - Teaching & Learning Objectives

To create a more sustainable world and to engage with issues related to sustainability as described in the Sustainable Development Goals (SDGs), individuals must become sustainability change-makers. They require the knowledge, skills, values and attitudes that empower them to contribute to sustainable development. Education is thus crucial for the achievement of sustainable development, and Education for Sustainable Development is particularly needed because it empowers learners to take informed decisions and act responsibly for environmental integrity, economic viability and a just society, for present and future generations.

This hand book guides readers on how to use education, especially to achieve the SDGs. It identifies teaching & learning objectives, suggests topics and learning activities for each SDG, and describes implementation at different levels from course design to national strategies. The document aims to support policy-makers, curriculum developers and educators in designing strategies, curricula and courses to promote learning for the SDGs.

## Learning objectives for teachers to promote SDG

Know about sustainable development, the different SDGs and the related topics and challenges

Understand the discourse on and the practice of in local, national and global context

Develop their own integrative view of the issues and challenges of sustainable development by considering the social, ecological, economic and cultural dimensions from the perspective of the principles and values of sustainable development, including that of intergenerational and global justice

Take disciplinary, interdisciplinary and transdisciplinary perspectives on issues of global change and their local manifestations

Reflect on the concept of sustainable development, the challenges in achieving the SDGs, the importance of their own field of expertise for achieving the SDGs and their own role in this process

Understand how cultural diversity, gender equality, social justice, environmental protection and personal development are integral elements of ESD and how to make them a part of educational processes

Practice an action-oriented transformative pedagogy that engages learners in participative, systemic, creative and innovative thinking and acting processes in the context of local communities and learners' daily lives

Act as a change agent in a process of organizational learning that advances their school towards sustainable development

Identify local learning opportunities related to sustainable development and build cooperative relationships

Evaluate and assess the learners' development of cross-cutting sustainability competencies and specific sustainability-related learning outcomes

## Key elements for whole-institution approaches

An institution-wide process that enables all stakeholders – leadership, teachers, learners, administration – to jointly develop a vision and plan to implement ESD in the whole institution.

Technical and financial support to the institution to support its reorientation, including for instance the provision of relevant good practice examples, training for leadership and administration, the development of guidelines and associated research.

Inter-institutional networks that facilitate mutual support such as peer-to-peer learning on a whole-institution approach, and increase the visibility of the approach to promote it as a model for adaptation.

## Key methods for learning for the SDGs

Collaborative real-world projects, such as service-learning projects and campaigns for different SDGs

Vision-building exercises such as future workshops, scenario analyses, utopian/dystopian story-telling, science-fiction thinking, and forecasting and back casting

Analyses of complex systems through community-based research projects, case studies, stakeholder analysis, actors' analysis, modelling, systems games, etc.

Critical and reflective thinking through fish-bowl discussions, reflective journals, etc.



### *‘Touching the lives of Millions’*

Focusing on a purpose as expansive and yet as specific as improving quality of life through Human Development, the JSS Mahavidyapeetha has grown from strength to strength. A long and healthy life, Education for all and a decent standard of living, the indicators of Human development, have been the underlying philosophy of Jagadguru Sri Veerasimhasana Mahasamsthana Math, Suttur Srikshethra, for centuries. This is also the philosophy for which the Mahaidyapeetha today stands for.

Under the untiring efforts of Jagadguru Dr. Sri Shivarathri Rajendra Mahaswamiji, the Mahavidyapeetha has witnessed enormous growth in the field of education and today has over 300 institutions under its fold, from kindergartens to postgraduate centres and postdoctoral research catering to the educational needs of more than 1,00,000 students.

The Mahavidyapeetha continues to play an important role in expanding the scope of its activities to several branches of knowledge, welfare, and culture. Its educational efforts span crèches for toddlers of working rural women, schools to impart primary and secondary education in both Kannada and English medium, Colleges, Polytechnics, Technical, Medicine, etc. For realizing its mission, it has equipped itself with an extensive infrastructure and an army of dedicated and highly qualified human resource. These institutions, located in strategic areas, serve a broad spectrum of society, from virtually remote tribal villages to metropolitan cities such as Bengaluru, Noida, New Delhi, Ooty, and Coimbatore, besides their presence in United States, Mauritius, and Dubai.

Apart from formal education, the initiatives stretch to integrated rural development through training and empowering of rural folk, reaching out healthcare to people through modern and traditional Indian systems of medicine, patronizing literary activities, visual arts, performing arts, restoration of temples and historical monuments.

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