JSS ACADEMY OF HIGHER EDUCATION & RESEARCH
(DEEMED TO BE UNIVERSITY) M Y S U R U

SUSTAINABLE DEVELOPMENT GOALS

Education for

Education 2030

Sustainable Development Goals

Teaching & Learning Objective Handbook
Division of Medical Physics

SUSTAINABLE
DEVELOPMENT
GOALS

Education for

Sustainable Development Goals

Teaching & Learning Objective Handbook
Division of Medical Physics

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.

Dr. K.A. Raveesha
Professor & Head
School of Life Sciences

PREFACE

Medical Physics deals with the application of the concepts and methods of physics to the prevention, diagnosis and treatment of human diseases with a specific goal of improving human health and well-being. In the Division of Medical Physics, School of Life Sciences, JSS AHER, offer master's program and research in Medical Physics. The importance of this Medical Physics Subject in achieving SDGs is very crucial, since it is essential for creating a sustainable, community-based Service for achieving the SDGs.

At educational level Division of Medical Physics is providing students with the knowledge, application skills, and motivation to understand and address the challenges of the SDGs; empowering and mobilizing young people; providing in-depth academic or practical or application training to implement SDG solutions; enhancing opportunities for capacity building of students for better & accurate service and professionals from the society to address challenges relating to the SDGs.

Although medical physics may sometimes also be referred to as *biomedical physics, medical biophysics, applied physics in medicine, physics applications in medical science, radiological physics or hospital radio-physics, however a "*[medical physicist]*"* is specifically a health professional with specialist education and training in the concepts and techniques of applying physics in medicine and competent to practice independently in one or more of the subfields of medical physics. We initiated this PG programme with the approval of Atomic Energy Regulatory Board (AERB) which is mandatory as per the UGC Norms.

We also encouraging and promoting the SDGs as a topic of research within the Medical Physics; supporting the full spectrum of research approaches needed to address the SDGs, including transdisciplinary research; supporting and incubating innovation for sustainable development solutions; actively supporting national and local implementation of the SDGs; advocating for national support and coordination of research on the SDGs.

Dr. Shanmukhappa B Kaginelli
Associate Professor & Course Coordinator
Division of Medical Physics

Faculty Details:

		We are having the MoU's with HCG Bharath Institute & Oncology, Narayana Hrudayalaya Multispecialty Hospital, Mysore
Ms. Khansa fathima Assistant Professor JS180024 Qualification: M.Sc. (Medical Physics) Date of Joining: 15/05/2018	**Mrs. Bhavya Shree P** Assistant Professor JS210117 Qualification: M.Sc. Medical Physics) Date of joining - 23/12/2021	For routine Medical Physics Practicals. Also, we have MoU's with other Institutes for students exchange programme.

TABLE OF CONTENTS

1. No Poverty

2. Zero Hunger

3. Good health and well being

4. Quality Education

5. Gender Equality

6. Clean water and Sanitation

7. Affordable and Clean energy

8. Decent work and Economic Growth

9. Industry Innovation and Infrastructure

10. Reduce Inequalities

11. Sustainable cities and Communities

12. Responsible consumption and Production

13. Climate action

14. Life below Water

15. Life on Land

16. Peace, Justice and Strong Institutions

17. Partnership for the goals

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 1 – NO POVERTY

End poverty in all its forms everywhere
Teaching & Learning objectives for SDG 1 "No Poverty"

Subject/ topic/ course in regular curriculum relating to SDG 1	• Radiation dosimetry and Instrumentation
Cognitive Teaching & learning objectives	• At the end of Professional year the learner should be able to • Describe poverty and its impact on health and disease • The learner knows about causes and impacts of poverty such as unequal distribution of resources and power, colonization, conflicts, disasters caused by natural hazards • The learner understands how extremes of poverty and extremes of wealth affect basic human rights and needs.
Socio-emotional Teaching & learning objectives	• Support families in poverty alleviation through various government health schemes and programs related to disease
Behavioural Teaching & learning objectives	• Conduct awareness sessions on various social security, assistance measures and government schemes for people below poverty line. • Give health related advise to the individuals and families with various illnesses in a way that is suitable for their economic status

Examples of learning approaches and methods for SDG 1 "No Poverty"

- The learner knows about the local national and global distribution of radiation related instruments including radiation therapy machine(LINAC), cobalt teletherapy machines, brachytherapy units manufactured by several companies like Varian, Elekta, AECL, Pancea…
- The learner understands the extremity of poverty that affect basic human rights and needs that in turn very difficult to defeat the cancer disease because of its high expensive treatment
- The learner can collaborate with others to empower individuals and provide psycho social support to defeat cancer since, people have anxiety ,Socio-economic feelings.
- Case study of cancer patient is must on understanding his/her wealth background
- Educating people about cancer by conducting medical awareness camps conducted in local areas to provide support to end on poverty.

Suggested topics for SDG 1 "No Poverty" for students' workshop

- By encouraging blood donation camps to cancer patients as the patient requires blood transfusion during surgery, chemotherapy and radiation therapy for their treatment purpose in cancer treatment of the below poverty patients.

- Educating people about the government schemes and Health Insurances

- Consequences of poverty such as malnutrition, mortality.

- Policy frameworks at the local, national and international levels, based on pro-poor and gender-sensitive development strategies

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

Teaching & Learning objectives for SDG 2 "Zero Hunger"

Subject/ topic/ course in regular curriculum relating to SDG 2	• Anatomy and Physiology
Cognitive Teaching & learning objectives	• Describe the causes, clinical features, prevention, and control of nutritional health problems.
Socio-emotional Teaching & learning objectives	• Can reflect on nutritional status, causes and consequences of under-nutrition based on patient and community interaction. • Can feel affinity, responsibility and solidarity for and with people suffering from the disease.
Behavioural Teaching & learning objectives	• Conduct health education sessions at community setting on causes, consequences and prevention of the disease.

Suggested topics for SDG 2 "Zero Hunger"

- Head & neck, breast, gynecological, gastro intestinal tract, genitourinary, lung and thorax lymphomas and leukemias and other cancers including AIDS and related cancer
- The above mentioned cancers can be treated by providing nutritious food
- And educating about healthy diet, obesity.

Examples of learning approaches and methods for SDG 2 "Zero Hunger"

- Perform role-plays by the concept of quit smoking,, tobacco consumption and alcohol addiction
- Carry out scenario development and analysis of local or national food production and consumption systems which leads in preventing of cancer disease
- Carry out case study analyses of adequate and non-adequate public policies or management strategies for prevention of cancer
- Organize excursions and field trips to places where cancer patients with poor diet and malnutrition can be helped by providing beneficiary diet plans

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	• Radiation biology
Cognitive Teaching & learning objectives	• The learner knows conceptions of health, hygiene and well-being and can critically reflect on them, including an understanding of the importance of gender in health and well-being. • Discuss about the addictions to alcohol, tobacco or other drugs cause harm to health and well-being. • The learner knows relevant prevention strategies to foster positive physical and mental health and well-being, including reproductive health and information as well as early warning and risk reduction. • Discuss objectives, scope, strategies and provisions under various national health programs and schemes against cancer related diseases in India. • Understand medico legal aspects in various circumstances associated with morbidities and mortalities.
Socio-emotional Teaching & learning objectives	• Communicate with individuals, families and communities on prevention of diseases, promotion of healthy lifestyles and enhance health seeking behavior at community setting. • Effectively communicate with patients attending the health centres with cancer related illnesses.
Behavioural Teaching & learning objectives	• Demonstrate the skills of history taking, clinical examination, diagnosis and management of various cancer related diseases at primary, secondary and tertiary care settings.

Suggested topics for SDG 3 "Good Health and Well-being"

- Cancer is a non-communicable diseases .
- Health problems of vulnerable groups and in the most vulnerable regions, and an understanding of how gender inequalities may affect health and well-being by Cellular effects of radiation-inactivation's mitotic delay DNA damage chromosomal aberrations mutations and recombination's.

- Direct strategies to promote health and well-being, e.g. healthy food, physical activity, mental health, medical consultation,   reproductive health education including education about sexuality & pregnancy. Educating people of getting unnecessary exposure of radiation zone.

- Indirect strategies (public health) to promote health and well-being: e.g. political programs for health insurances, affordable prices of medicine, health services including reproductive health care services, drug prevention, transfer of knowledge and technology, reduction of pollution and contamination, early warning and risk reduction in order to prevent cancer growing among the population.

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

- Overweight and obesity, insufficient physical activity, and unhealthy food can lead to cancer growth among populations

Examples of learning approaches and methods for SDG 3 "Good Healthand Well-Being"

- Propagating the "**World cancer day**" (4th February) awareness.

- Watch videos that show health promoting behaviors (e.g. saying "No" tobacco & alcohol)

- Encourage students participating in ethical, reflective essay writing and/or discussions about what a life of health and well-being

- Engage with storytelling by people with severe diseases, drug addictions, related to cancer causing activities.

- 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 participating in cancer awareness programs).

SDG 4 - Quality Education

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Teaching & Learning objectives for SDG 4 "Quality Education"

Subject/ topic/ course in regular curriculum relating to SDG 4	• Radiation physics and Radiation biology
Cognitive Teaching & learning objectives	• The learner understands the importance of early clinical exposure(Radiation exposure). • Recognize the relevance of basic sciences in diagnosis, patient care and Treatment (Radiation therapy).
Socio-emotional Teaching & learning objectives	• The learner can recognize the importance of their own skills for improving their life, for employment. • The learner is able through participatory methods to motivate and empower others to demand and use educational opportunities.
Behavioural Teaching & learning objectives	• The learner understands the important role of culture in achieving sustainability. • The learner understands the important role of education and lifelong learning opportunities for all (formal, nonformal and informal learning) as main drivers of sustainable development, for improving people's lives and in achieving the SDGs

- The relevance of inclusive and equitable quality education and lifelong learning opportunities for formal and nonformal topics like radiation biology anatomy and physiology and radiation protection and safety standards in order to educate about and radiation benefits and its harm

- Lack of access to education with respect to radiation usage and its harmful effects can lead to decrease in quality education

- Knowledge, values, skills and behaviors in concept of radiation needed to promote sustainable development.

Examples of learning approaches and methods for SDG 4 "Quality Education"

- Develop partnerships between schools, universities and other institutions offering education in aspects of radiation

- Plan and run a quality education awareness campaign with respect to cancer and radiation awareness

- Plan and run a project at a school or university, or for the local community on cancer awareness

- Celebrate cancer awareness week programs in schools and hospitals.

SDG - 5 Gender Equality

Achieve gender equality and empower all women and girls

Teaching & Learning objectives for SDG 5 "Gender Equality"

Subject/ topic/ course in regular curriculum relating to SDG 5	• Radiation protection safety and standards
Cognitive Teaching & learning objectives	• Describe and discuss on gender issues at various stages of life. • Discuss in detail about women empowerment and benefits for the society. • Discuss Pre-conception and Prenatal-Diagnostic Techniques (PCPNDT)-Prohibition of Sex Selection Act 2003 and Domestic Violence Act 2005.
Socio-emotional Teaching & learning objectives	• Identify and defend medico-legal, socioeconomic and ethical issues. • Can reflect on their own gender identity and gender roles.
Behavioural Teaching & learning objectives	• Provide family education in a patient with gender identity disorders in a simulated environment.

Suggested topics for SDG 5 "Gender Equality"

- No Gender discrimation in providing the cancer treatment.

- Equal opportunity in work place for both men and women depending upon ability and eligibility

- Gender and education, including gender equality in achieving primary, secondary and tertiary levels of education

- Gender and poverty, including food security and financial dependence

Examples of learning approaches and methods for SDG 5 "Gender Equality"

- Celebration of "**Breast Cancer day"** awareness among the women

- Invite speakers who have defeated breast cancer

- Perform role-play games that explore all types of cancer awareness

- Explore how natural hazards and disasters affect women, girls, men and boys differently

Ensure availability and sustainable management of water and sanitation for all

Teaching & Learning objectives for SDG 6 "Clean Water and Sanitation"

Subject/ topic/ course in regular curriculum relating to SDG 6	• Radiation protection safety and standards
Cognitive Teaching & learning objectives	• Describe the health hazards of air, water, noise, radiation and pollution. • Describe the types, hazards and management of biomedical waste and Radiation waste. • Describe the concept of solid waste, human excreta and sewage disposal in Nuclear medicine waste management.
Socio-emotional Teaching & learning objectives	• Communicate with families on importance of waste disposal. • Can feel empathy, responsibility and solidarity for and with people for sanitation and hygiene.
Behavioural Teaching & learning objectives	• Impart appropriate advise on prevention of water and sanitation related advices to the patients at hospital settings. • Manage biomedical waste and radiation waste generated at patient care at the clinical setting in an appropriate manner.

- Radioactive waste disposals and transport of Radio isotopes as per the guidelines of the AERB and IAEA

- Radioactive wastes- classification of waste – permissible limits for disposable of waste- sampling techniques for air water and solids- geological hydrological and metrological parameters -management of radioactive waste in medical industrial agricultural and research establishments.

- The importance of adequate and equitable sanitation and hygiene, water quality and quantity parameters for health & well-being.

Ensure access to affordable, reliable, sustainable and clean energy for all
Teaching & Learning objectives for SDG 7 "Affordable and Clean Energy"

|	
Subject/ topic/ course in regular curriculum relating to SDG 7	• External beam radiation therapy and brachytherapy
Cognitive Teaching & learning objectives	• Describe the health hazards of radiation hazards.
Socio-emotional Teaching & learning objectives	• Advocate the importance of having clean sources of energy.
Behavioural Teaching & learning objectives	• Conduct health education sessions for people at risk about the radiation hazards and its sequences (Ionizing radiation is highly carcinogenic) • Recognize the clinical signs of diseases that are exclusively caused due to contaminated sources of energy.

Suggested topics for SDG 7 "Affordable and Clean Energy"

- X rays and Gamma rays in both diagnostic and therapeutic of cancer treatment.

- To select the appropriate treatment machines for the appropriate cancer, teletherapy brachytherapy can be choosen.

- Clinical electron beams- Energy specification , Electron energy selection for patient treatment.

Examples of learning approaches and methods for SDG 7 "Affordableand Clean Energy"

- Organize excursions to energy sites including ethical discussions with pros and cons of energy types and projects

- Conduct awareness for the diagnostic and therapeutic purpose of radiation

SDG 8 - Decent Work and Economic Growth
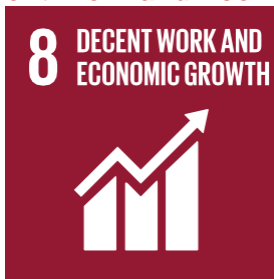
Promote sustained inclusive and sustainable economic growth, full and productive employment, and decent work for all

Teaching & Learning objectives for SDG 8 "Decent Work and Economic Growth"

Subject/ topic/ course in regular curriculum relating to SDG 8	• Special and Advances Technique of Radiotherapy • Applied Anatomy • Applied Medical Imaging
Cognitive Teaching & learning objectives	• At the end of professional year the learner should be able to align them for carrier, professionalism, time management, study skills. • Describe the health hazards of air, water, noise, radiation and pollution. • Understand the concepts of health economics including planning, programming, budgeting. • Enumerate and describe specific occupational health hazards, their risk factors and preventive measures. • Describe man-made disasters in the world and in India related to Radio-active Isotopes.
Socio-emotional Teaching & learning objectives	• Enumerate the rights and entitlements of differently abelled persons. • Counsel an economically backward family on the utilization of government programs and schemes. • Communicate the importance of health insurance to the individuals and families.
Behavioural Teaching & learning objectives	• Assess the impact of illness on the socioeconomic status of the family and vice versa. • Conduct awareness sessions on government programme, schemes for economically backward sections of the society. • Demonstrate adequate knowledge and use of information technology that permits appropriate patient care and continued learning.

Suggested topics for SDG 8 "Decent Work and Economic Growth"

- Adopting of New technologies in the radiotherapy techniques like IMRT, IGRT,VMAT…

- By the adoption of new technologies in radiotherapy influences the quality of the treatment of cancer patients.

    s

Examples of learning approaches and methods for SDG 8 "Decent Work and Economic Growth"

- Plan and execute the newer technologies in the treatment of cancer leads the quality of the treatment.

- By inviting the technical experts to the institution, students and faculties will have the exposure of newer techniques and also visit of sophisticated radiotherapy institutions.

Reduce inequality within and among countries
Teaching & Learning objectives for SDG 10 "Reduced Inequalities"

Subject/ topic/ course in regular curriculum relating to SDG 10	• Professional aspects and role of Medical Physicist
Cognitive Teaching & learning objectives	• At the end of professional year, the learner should be able to: • Understand the concept of equity, equality, justice and inequality.
Socio-emotional Teaching & learning objectives	• At the end of final year, the learner should be able to: • Demonstrate ability to communicate to patients in a respectful, non-threatening, non-judgmental and empathetic manner.
Behavioural Teaching & learning objectives	• The learner can identify or develop an objective indicator to compare different groups, nations, etc. with respect to inequalities. • The learner can identify and analyse different types of causes and reasons for inequalities. • The learner can plan, implement and evaluate strategies to reduce inequalities. • The learner can engage in the development of public policies and corporate activities that reduce inequalities

Suggested topics for SDG 10 "Reduced Inequalities"

- There is no Social, economic and political inclusion versus inequalities (on national and global levels) – typical discriminatory categories in the treatment of cancer.

- There is no inequality among the cancer patients.

Examples of learning approaches and methods for SDG 10 "ReducedInequalities"

- Play simple distribution games to discuss psychological effects of unfair and unequal treatment or the exacerbation of the impacts of Radiation hazards

- Plan an cancer awareness in rural areas

- Analyze one's own personal history considering times where one was privileged or

  discriminated during the cancer treatment

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	• Radiation Safety and Standards
Cognitive Teaching & learning objectives	• Follow the Radiation Safety and Radiation Standards stipulated by the Radiation Regulatory authority. • Describe the health hazards related to Radiation and Nuclear Medicine.
Socio-emotional Teaching & learning objectives	• Awareness to the patient and public about the Radiation ALARA principle.
Behavioural Teaching & learning objectives	• Conduct health education sessions on responsible consumption and production for school and college students.

- Production and consumption of radioactive isotopes with safer manner as per the AERB Safety guidelines.

- Disposal of Radioactive waste isotopes disposed as per the AERB Safety guidelines.

- Display of the Radiation symbols in the respective radiation area.

- Display of Diagnostic Xray procedures and therapeutics should be displayed on the public notice board

- Radioactive Isotopes transportation should be carried out as per the

  AERB guidelines.

- Radioactive wastes -classification& segregation should be done as

  per the AERB guidelines .

Examples of learning approaches and methods for SDG 12 "ResponsibleConsumption and Production"

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	• Radiation Protection and Safety Standards • Nuclear Medicine & Internal Dosimetry and Brachytherapy
Cognitive Teaching & learning objectives	• Describe the health hazards of air, water, noise, radiation and pollution. • Describe toxic pollution of environment, its medicolegal aspects & toxic hazards of occupation and industry. • At the end of Professional year the learner should be able to, • Describe the concept of solid waste, human excreta and sewage disposal related to Nuclear medicine waste management.
Socio-emotional Teaching & learning objectives	• The learner can argue against destructive environmental practices that cause biodiversity loss. • The learner can connect with their local natural areas and feel empathy with non- human life on Earth. • The learner can question the dualism of human/nature and realizes that we are a part of nature and not apart from nature. • The learner can create a vision of a life in harmony with nature.
Behavioural Teaching & learning objectives	• Conduct sessions at community setting on causes, consequences and prevention of Radiation hazards.

Suggested topics for SDG 15 "Life on Land"

- Radiation therapy as treatment modality which controls the cancer/cures

- Life enhancement for the cancer patient

- Giving hope and cheerness to the cancer affected patients.

Examples of learning approaches and methods for SDG 15 "Life on Land"

- Perform an annual day when the community comes together to map as many different treatment modalities in treatment of cancer area as possible.

- Evaluation of external radiation hazards and evaluation of exposures like occupational public and medical exposures.

- Take an excursion to a nearby rural areas for creating awareness in cancer.

- Celebrate "world environment day" by adding awareness of radiation exposure.

SDG 16 - 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.

Teaching & Learning objectives for SDG 16 "Peace, Justice and Strong Institutions"

Subject/ topic/ course in regular curriculum relating to SDG 16	• Professional aspects and role of Medical Physicist
Cognitive Teaching & learning objectives	• At the end of final year the learner should be able to Communicate with the patient with empathy and ethics on all aspects of Radiation use. • Describe and discuss the ethics related to Radiation Therapy.
Socio-emotional Teaching & learning objectives	• Communicate and counsel patients and families about the Diagnosis, Treatment and Prognosis of shock demonstrating empathy and care.
Behavioural Teaching & learning objectives	• Display empathy in the care of patients with cancer. • Demonstrate responsibility and work ethics while working in the health care team. • Communicate with the patient with empathy and ethics on all aspects of Radiation use. • Demonstrate Professionalism and empathy to the patient undergoing Radiation treatment.

Suggested topics for SDG 16 "Peace, Justice and Strong Institutions"

- We follow and teach AERB and IAEA regulations

- Definitions of justice: Following the principles of professional practice

- Maintaining patient privacy

- Legal aspects like confidentiality and Informed consent

- Supporting ethical and cultural issues

- And promoting health and safety of the individual(cancer patients).

Examples of learning approaches and methods for SDG 16 "Peace, Justice and Strong Institutions"

- Maintenance of the treatment data .

- Maintaining the confidentiality of patient data as per the institution regulations.

- Professional should be adhere of Institutional regulations as well as Human rights.

SDG 17 - Partnerships for the Goals

Strengthen the implementation and revitalize the global partnership for sustainable development

Teaching & Learning objectives for SDG 17 "Partnerships for the Goals"

Subject/ topic/ course in regular curriculum relating to SDG 17	• Radiation Therapy
Cognitive Teaching & learning objectives	• Describe roles of various international health agencies WHO (World Health Organization), IAEA (International Atomic Energy Agency), National health organizations, AERB (Atomic Energy Regulatory Board)and BARC (Bhabha Atomic Research Centre) related Radiation Diagnosis and Radiation Therapy • Describe in detail various National programs (National Health Mission, National Programme for Prevention and Control of Cancer).
Socio-emotional Teaching & learning objectives	• At the end of final year, the learner should be able to Appreciate the role of voluntary health agencies in providing health care. • Reflect on the importance of partnerships and collaboration in health care..
Behavioural Teaching & learning objectives	• The learner can Perform Collaborative research work through electives. • The learner can support development cooperation activities. • The learner can influence companies to become part of global partnerships for sustainable development.

Suggested topics for SDG 17 "Partnerships for the Goals"

- Our Institution having the MoA and MoU's with reputed cancer institutions ,Kidwai Memorial Institute of Oncology, Bengaluru , M.S. Ramaiah Medical College, Bengaluru, Homi Bhabha Cancer Hospital and Research Centre , Vishakapatnam, HCG Bharath cancer hospital and Oncology Institute, Mysuru, Narayana Hrudalaya Multispeciality Hospital ,Mysuru.

Examples of learning approaches and methods for SDG 17 "Partnerships for the Goals"

- By having the MoU's and MoA our Medical Physics students are undergoing routine practical's, project works /dissertation , Internship programs.

CONCLUSIONS

To conduct basic and translational research that will lead to new applications of Physics for Diagnosis and Treatment of Disease…

… by focusing on medical imaging, radiotherapy, and radiation metrology. We are committed to train the students that will benefit patients in our community. Our research themes are strongly aligned with improving treatment precision using localized and minimally invasive therapies that will improve personal patient outcomes.

Learning objectives for teachers to promote SDG

Know about sustainable development, the different SDGsand 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 andvalues 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 SGDs, the importance of their own field of expertise for achieving the SDGs and their ownrole in this process

Understand how cultural diversity, gender equality, social justice, environmental protection and personal development are integral elements of ESD and how to makethem 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 oflocal communities and learners' daily lives

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

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-institutionapproaches

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.

REFERENCE

1. Human Rights and the 2030 Agenda for Sustainable Development http://www.ohchr.org/EN/Issues/MDG/Pages/The2030Agenda.aspx
2. OECD and the Sustainable Development Goals: Delivering on universal goals and targets https://www.oecd.org/dac/sustainable- development-goals.htm
3. SDG Indicators http://unstats.un.org/sdgs/indicators/indicators-list/
4. The Guardian: Sustainable development goals: all you need to know https://www.theguardian.com/global-development/2015/jan/19/ sustainable-development-goals-united-nations
5. The UN Sustainable Development Knowledge Platform sustainabledevelopment.un.org https://sustainabledevelopment. un.org/topics/sustainabledevelopmentgoals
6. UNESCO and Sustainable Development Goals http://en.unesco.org/ sdgs
7. UN Sustainable Development / SDGs http://www.un.org/ sustainabledevelopment http://www.un.org/sustainabledevelopment/sustainable- development-goals
8. World Economic Forum: What are the Sustainable Development Goals? https://www.weforum.org/agenda/2015/09/what-are-the- sustainable-development-goals
9. British Council: Sustainable Development Goals resource https:// schoolsonline.britishcouncil.org/sites/default/files/sdg_education_ pack_v3.pdf
10. Gaia Education's Design for Sustainability E-learning Programme http://www.gaiaeducation.org/index.php/en/online
11. GlobalGiving: Crowdfunding for the SDGs https://www.globalgiving. org/sdg/
12. Green Pack: Teaching material on sustainability issues http://education.rec.org/green-pack.html
13. OpenLearn. The Open University: Material for self-study on all kinds of topics http://www.open.edu/openlearn/
14. OXFAM: A selection of suggested teaching ideas around the SDGs https://www.oxfam.org.uk/education/resources/sustainable- development-goals
15. Sustainability Gamepedia: A database of games related to sustainability http://www.games4sustainability.org/gamepedia/
16. Teaching and Learning for a Sustainable Future: Resources for teachers about teaching approaches as well as classroom activities on diverse topics related to sustainability http://www.unesco.org/education/tlsf/mods/theme_gs.html
17. Teach UNICEF: Collection of teacher resources on the SDGs https://teachunicef.org/teaching-materials/topic/sustainable- development-goals
18. The Goals.org: Free global education and learning portal on sustainable development solutions http://www.thegoals.org
19. The Lazy Person's Guide to Saving the World http://www.un.org/ sustainabledevelopment/takeaction
20. The Story of Stuff: An online resource that investigates the humanity's unsustainable use of materials http://storyofstuff.org
21. The World We Want. A Guide to the Goals for Children and Young People http://www.unicef.org/agenda2030/files/TWWW_A4_ Single_Page_LowRes_English.pdf
22. The Youth resource pack from MYCI: Methodolgies for introducing the SDGs to young people in an engaging and informative manner http://www.youth.ie/sites/youth.ie/files/SDGs_Youth_ Resource%20_Pack.pdf
23. UNESCO: Good Practices in Teacher Education Institutions http:// unesdoc.unesco.org/images/0015/001524/152452eo.pdf
24. World's Largest Lesson: Find everything you need to introduce the SDGs to young people, take part and take action http:// worldslargestlesson.globalgoals.org
25. Young Masters Programme on Sustainable Development: Online courses and international exchange between students on sustainable development http://www.goymp.org/en/frontpage
26. YUNGA Challenge Badges: Developed in collaboration with UN agencies, civil society and other

organizations, YUNGA Challenge Badges aim to raise learners' awareness, educate and motivate them to change their behaviour and become active agents

27. of change in their local community. The series can be used by teachers in school classes as well as by youth leaders. http://www. fao.org/yunga/resources/challenge-badges/en/
28. Organizations and initiatives
29. Eco-Schools Networks http://www.ecoschools.global
30. Food and Agriculture Organization of the United Nations (FAO) http:// www.fao.org/home/en/
31. GAIA Education http://www.gaiaeducation.org
32. Global Ecovillage Network http://www.gen.ecovillage.org Global Footprint Network http://www.footprintnetwork.org/en/
33. index.php/GFN/
34. Higher Education Sustainability Initiative (HESI) https:// sustainabledevelopment.un.org/sdinaction/hesi
35. ICLEI: Local Governments for Sustainability http://www.iclei.org International Institute for Sustainable Development
36. http://www.iisd.org
37. Sustainable Development Solutions Network http://unsdsn.org UNESCO ASPnet schools http://www.unesco.org/new/en/education/
38. networks/global-networks/aspnet
39. United Nations Development Programme http://www.undp.org/ United Nations Environment Programme http://www.unep.org World Federation of UNESCO Clubs, Centres and Associations
40. (WFUCA) http://wfuca.org/
41. World Health Organization http://www.who.int/en/
42. Education for Sustainability Starter Kit http://www. sustainableschoolsproject.org/tools-resources/starter-kit
43. Education for Sustainable Development Toolkit http://www. esdtoolkit.org/
44. German Curriculum Framework Education for Sustainable Development http://ensi.org/global/downloads/Publications/418/Curriculum%20Framework%20ESD%20final%201.pdf
45. Guide to Education for Sustainability http://sustainableschoolsproject.org/sites/default/files/EFSGuide2015b.pdf
46. Guide to Quality and Education for Sustainability in Higher Education http://efsandquality.glos.ac.uk/
47. Shaping the future we want. UN Decade of ESD. Final report http://unesdoc.unesco.org/images/0023/002303/230302e.pdf
48. UNESCO's Roadmap to ESD. Implementing the Global Action Programme http://unesdoc.unesco.org/ images/0023/002305/230514e.pdf
49. UNESCO's Teaching and Learning for a Sustainable Future http:// www.unesco.org/education/tlsf/
50. Vanderbilt University's Guide for Teaching Sustainability https://cft. vanderbilt.edu/guides-sub-pages/teaching-sustainability
51. Whole-school approaches to sustainability: A review of models for professional development in pre-service teacher education
52. (Australian Research Institute in Education for Sustainability) http:// aries.mq.edu.au/projects/preservice/files/TeacherEduDec06.pdf
53. Lotz-Sisitka, H., Wals, A. E., Kronlid, D. and McGarry, D. 2015. Transformative, transgressive social learning: rethinking higher education pedagogy in times of systemic global dysfunction. Current Opinion in Environmental Sustainability, Vol. 16, pp. 73–80.
54. McCormick, K., Muhlhauser, E., Norden, B., Hansson, L., Foung,
55. C., Arnfalk, P., Karlsson, M. and Pigretti, D. 2005. Education for sustainable development and the Young Masters Program. Journal of Cleaner Production, Vol. 13, No. 10-11, 1107-1112.
56. Mezirow, J. 2000. Learning as transformation: critical perspectives on a theory in progress. San Francisco, Jossey-Bass.
57. Organisation for Economic Co-operation and Development (OECD). 2009. Green at Fifteen? How 15-year-olds Perform in Environmental Science in PISA 2006. Paris, OECD.

58. Organisation for Economic Co-operation and Development (OECD). 2016. Global competency for an inclusive world. https://www.oecd. org/pisa/aboutpisa/Global-competency-for-an-inclusive-world.pdf (Accessed 29 October 2016)

59. Rauch, F., Steiner, R. 2013. Competences for education for sustainable development in teacher education. CEPS Journal, Vol. 3, No. 1, pp. 9–24

60. Rieckmann, M. 2012. Future-oriented higher education: Which key competencies should be fostered through university teaching and learning? Futures, Vol. 44, No. 2, pp. 127–135.

61. Rychen, D.S. 2003. Key competencies: Meeting important challenges in life. Rychen, D.S. and Salganik, L.H. (eds). Key competencies for a successful life and well-functioning society. Cambridge, MA, Hogrefe and Huber, pp. 63–107.

62. Schulz, W., Ainley, J., Fraillon, J., Kerr, D. and Losito, B. 2010.

63. ICCS 2009 International Report: Civic knowledge, attitudes, and engagement among lower-secondary school students in 38 countries. Amsterdam, International Association for the Evaluation of Educational Achievement.

64. Slavich, G. M. and Zimbardo, P. G. 2012. Transformational Teaching: Theoretical Underpinnings. Basic Principles, and Core Methods. Educational Psychology Review, Vol. 24, No. 4, pp. 569–608.

65. Sleurs, W. 2008. Competencies for ESD (Education for Sustainable Development) teachers. A framework to integrate ESD in the curriculum of teacher training institutes. http://www.unece.org/fileadmin/DAM/env/esd/inf.meeting.docs/EGonInd/8mtg/ CSCT%20Handbook_Extract.pdf (Accessed 17 June 2016)

66. Tsuneki, H. and Shaw, R. (forthcoming): Current policy development regarding Education for Sustainable Development and Climate Change Education in Costa Rica. Kyoto, Kyoto University.

67. United Nations Economic Commission for Europe (UNECE) 2005. UNECE Strategy for Education for Sustainable Development. https://www.unece.org/fileadmin/DAM/env/documents/2005/cep/ac.13/ cep.ac.13.2005.3.rev.1.e.pdf (Accessed 30 October 2016)

68. United Nations Economic Commission for Europe (UNECE). 2012. Learning for the Future: Competences in Education for Sustainable Development. http://www.unece.org/fileadmin/DAM/env/esd/ ESD_Publications/Competences_Publication.pdf

69. (Accessed 17 June 2016)

70. UNESCO. 2009. Bonn Declaration. http://www.desd.org/ESD2009 BonnDeclaration080409.pdf (Accessed 30 October 2016)

71. UNESCO. 2014. Shaping the Future We Want. UN Decade of Education for Sustainable Development (2005-2014). Final Report. http://unesdoc.unesco.org/images/0023/002301/230171e.pdf (Accessed 14 June 2016)

72. UNESCO. 2014b. UNESCO Roadmap for Implementing the Global Action Programme on Education for Sustainable Development. http:// unesdoc.unesco.org/images/0023/002305/230514e.pdf (Accessed 14 June 2016)

73. UNESCO. 2014c. EFA Global Monitoring Report 2013/4 – Teaching and Learning: Achieving quality for all. Paris, UNESCO. http://www.uis.unesco.org/Library/Documents/gmr-2013-14- teachingand-learning-education-for-all-2014-en.pdf

74. (Accessed 15 December 2016)

75. UNESCO. 2015a. Rethinking Education. Towards a global common good? http://unesdoc.unesco.org/images/0023/002325/232555e. pdf (Accessed 16 October 2016)

76. UNESCO. 2015b. Thematic Indicators to Monitor the Education 2030 Agenda. Technical Advisory Group Proposal. http://www.uis. unesco.org/Education/Documents/43-indicators-to-monitor-education2030.pdf (Accessed 29 October 2016)

77. UNESCO. 2016. Education 2030. Incheon Declaration and Framework for Action. Towards inclusive and equitable quality education and lifelong learning for all. Paris, UNESCO. http://www.uis.unesco. org/Education/Documents/incheon-framework-for-action-en.pdf (Accessed 16 October 2016)

78. United Nations. 2012. The future we want. Outcome document of the United Nations Conference on Sustainable Development, Rio de Janeiro, Brazil, 20–22 June 2012. https://sustainabledevelopment. un.org/content/documents/733FutureWeWant.pdf (Accessed 16

October 2016)

79. United Nations. 2015. Transforming our world: the 2030 Agenda for Sustainable Development. Resolution adopted by the General Assembly on 25 September 2015. http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E (Accessed 16 October 2016)

80. Vare, P. and Scott, W., 2007. Learning for a Change: Exploring the Relationship between Education and Sustainable Development. Journal of Education for Sustainable Development. 1(2), 191– 198.

81. Wals, A.E.J. 2015. Beyond unreasonable doubt. Education and learning for socio-ecological sustainability in the Anthropocene. Wageningen, Wageningen University. https://arjenwals.files.wordpress.com/2016/02/8412100972_rvb_inauguratie-wals_ oratieboekje_v02.pdf (Accessed 14 June 2016)

82. Wiek, A./Withycombe, L./Redman, C.L. 2011. Key competencies in sustainability: a reference framework for academic program development. Sustainability Science, Vol. 6, No. 2, pp. 203–218

'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.

https://jssonline.org/