

# **DEPARTMENT OF PHYSICS**

# LIST OF ADD-ON COURSES

1	ENERGY AND WATER CRISES IN 21ST CENTURY: CHALLENGES AND MANAGEMENT
2	PYTHON FOR DATA SCIENCE
3	ADVANCED LEARNING TOOLS FOR SCIENTIFIC PROJECT

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA-700 063 Website : www.vckolkata63.org • email : vivekanandacollege63@gmail.com

#### **IQAC** recommendation

IQAC, Vivekananda College, Thakurpukur, met on 04 May 2018, to envisage, formulate, and design Add-On Courses, beyond the prescribed Curriculum.

A. It was decided that all the departments of Humanities, Science and Commerce would design and formulate 30 hour Add-On Courses for 2018-19 Academic calendar, as per UGC guidelines.

B. It was decided that the Departments would be free to choose the Courses based on their (subject) relevance, practicality, and feasibility.

C. It was decided that the Departments would have a Course Coordinator, who would design the Course and Course material in consultation with all teachers of the Department.

D. It was decided that each Department would design its format.

E. It was decided that the Departments would be encouraged to use and utilize their resources while formulating the Add-On Courses, rather than relying on Outsourcing.

F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.

Lo-ordinator I Q A C Vivekananda College Kolkata-700 053



Ref. No.

Date 10/05/18

#### Notice

It is hereby notified that Vivekananda College, Thakurpukur, will offer Add-On Courses to All Honours students for the Academic year 2018-19.

Each Department will offer an Add-On Course as per UGC guidelines. Each Course will be structured & overseen by a Course Coordinator, selected from the respective Department. Departmental Heads are requested to take up the matter on an urgent basis.

105/18

Principal Vivekananda College Thakurpukur Kol-63

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063 Website : www.vckolkata63.org email : vivekanandacollege63@gmail.com

VIVEKANANDA COLLEGE, THAKURPUKUR

## NOTICE

#### Department of Physics

A departmental meeting will be held on 17.05.2018 at 1:00 p.m. to discuss on the topics mentioned below. All teachers are requested to kindly attend the meeting.

Agenda of the meeting:

- Introduction of Add-on course on "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management" for UG Sem I and Part II and Part III Honours and General students.
- ii) Miscellaneous.

HOD

#### VIVEKANANDA COLLEGE, THAKURPUKUR

#### **DEPARTMENT OF PHYSICS**

Resolution of the departmental meeting held on 17.05.2018

- A)Teachers present in the meeting:
- Dr. Arvind Pan
   Dr. Nirmalya Pahari
   Dr. Kaushik Ghosh
   Dr. Ambalika Biswas
   Dr. Arunava Jha
   Prof. Subhayan Biswas
   Prof. Somnath Paul
   Prof. Sreoshi Dutta
   Sri Debasish Chakraborty
   Minutes of the meeting
  - In the Departmental meeting dated 17.05.2018 the teachers of the Department of Physics unanimously decided that the UG Sem I Part II and Part III Honours would be offered a 32-hour Add-on Course on "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management".It was also decided in the meeting that Prof. Sreoshi Dutta and Prof Somnath Paulof Department of Physics would be the Course Coordinator for the Add-On Course for the Academic session 2018-2019.
  - The Course structure of the course on "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management" submitted by Prof. Sreoshi Dutta and Prof Somnath Paul was accepted by all teachers of the department.
  - Certificates would be given to each student at the successful completion of the Course.
  - The minimum attendance required for obtaining a completion certificate in the course is 75%.

To The Principal Vivekananda College, Thakurpukur, Kolkata 700063

Dear Sir,

I am writing to inform you that, starting this academic year, we are introducing one Add-on courses for our Honours and General students of our department.

Approximately One hundred twenty students from Sem I, Part II and Part III will be participating in the "Energy and Water Crises in 21st century: Challenges and Management"Add-on course. This course is scheduled to take place on Saturdays of the session 2018-19. The class will be held in Room No. S012 (Physics Gallery) from 3:00 p.m. to 5:00 p.m.

Your cooperation is highly appreciated. Thanking you,

Sincerely,

Arvind Pan Head of Department Department of Physics

Enclosure:

- 1. Resolution of the departmental meeting held on 17.05.2018
- 2. Proposal and Course structure for Introducing Add-on Program.

## Proposal and Course structure of Add-on Program "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management".

This course delves into the interrelated challenges of energy and water crises, exploring their causes, impacts, and management strategies. It examines the complex interactions between energy production, water resources, and environmental sustainability, aiming to equip students with the knowledge and skills to address these critical issues effectively.

Course Objectives:

- To comprehend the interconnected nature of energy and water crises and their implications for society and the environment.
- To analyze the drivers and consequences of water scarcity and pollution.
- To explore integrated approaches for sustainable energy and water management.
- To evaluate policy frameworks, technological innovations, and best practices in addressing water and energy challenges.
- To foster critical thinking and interdisciplinary collaboration through case studies and practical exercises.

The course curriculum of the program is given below.

Sl	Content	Training in hrs
no.		(30 hr)
1	Introduction to Energy and Water Crises	4hr
	<ul> <li>1.1 Overview of energy-water nexus: interdependencies and synergies.</li> <li>1.2 Definitions and scope of water crises: scarcity, pollution, access.</li> <li>1.3 Linkages between energy production, water consumption, and environmental degradation.</li> <li>1.4 Case studies highlighting the interconnected challenges of</li> </ul>	1 1 1
	energy and water management.	1

2	Causes and Consequences of Water Scarcity	4 Hrs
	2.1 Factors contributing to water scarcity: population growth,	1
	climate change, urbanization.	
	2.2 Impacts on agriculture, industry, human health, and ecosystem	
	services.	1
	2.3 water stress indicators and vulnerability assessments.	1
	socio-economic ramifications	
		1
3	Water Pollution and Quality Management	4 Hrs
	3.1 Sources and types of water pollution: industrial discharge,	
	agricultural runoff, urban sewage.	1
	3.2 Impacts on drinking water supplies, aquatic ecosystems, and	
	public health.	1
	3.5 water quality standards and monitoring techniques.	1
	5.4 Treventive technologies and politicion control measures.	1
4	Integrated Water-Energy Systems	4 Hrs
	4.1 Water footprint analysis in energy production: hydropower,	
	thermoelectric plants, biofuels.	1
	4.2 Energy requirements for water treatment, distribution, and	
	4.3 Opportunities for synergistic solutions and co-benefits	
	4.5 Case studies of integrated water-energy projects and their	
	effectiveness.	Ţ
5	Water Governance and Policy	4 Hrs
	5.1 Role of governments, regulatory agencies, and international	
	institutions in water management.	1
	5.2 Water rights, allocation mechanisms, and pricing strategies.	1
	5.3 Integrated water resources management (IWRM) approaches.	1
	5.4 Policy frameworks for addressing water conflicts and	1
	promoting equitable access.	
6	Technological Innovations and Best Practices	4 Hrs

	6.1 Water-saving technologies in agriculture, industry, and	
	households.	1
	6.2 Advanced water treatment and reuse techniques.	1
	6.3 Nature-based solutions for water conservation and ecosystem	
	restoration.	1
	6.4 Case studies of successful water management initiatives from	
	around the world.	1
7	Future Challenges and Opportunities	4 Hrs
	7.1 Emerging threats to water security: climate variability,	
	population growth, urbanization.	1
	7.2 Innovative approaches for addressing future water crises.	1
	7.3 Synergies between water and renewable energy technologies.	1
	7.4 Ethical considerations and social dimensions of water	
	governance.	1
8	Final Project Presentation and Discussion	2 Hrs
	Students present their research projects or case studies on energy-	
	water nexus issues	
	Peer evaluation and feedback	
	Discussion on practical implications and future directions for	
	sustainable resource management	

# (Add-on course class Routine)

SL	Content	Training	Date	Teacher
No		inhrs (30 hr)		
1	Introduction to Energy and Water Crises	4 hr		
	1.1 Overview of energy-water nexus:			
	interdependencies and synergies.	1	8/9/18	SD
	1.2 Definitions and scope of water crises:			
	scarcity, pollution, access.	1	8/9/18	SD
	1.3 Linkages between energy production, water		4 = 10 14 0	
	consumption, and environmental degradation.	1	15/9/18	SD
	1.4 Case studies highlighting the interconnected			
	challenges of energy and water management.	1	15/9/18	SD
2	Causes and Consequences of Water Scarcity	1 4 hr	15/5/10	50
2	2.1 Eactors contributing to water scarcity:	1	22/0/18	SD
	2.11 actors contributing to water searchly.	1 ×	22/3/10	50
	population growin, chinate change, urbanization.			
	2.2 Impacts on agriculture, industry, human			

	health, and ecosystem services.			
	2.3 Water stress indicators and vulnerability			
	assessments.	1	22/9/18	SD
	2.4 Case studies of regions facing severe water			
	snortages and their socio-economic ramifications	1	29/9/18	SD
		1	29/9/18	SD
3	Water Pollution and Quality Management	۸hr		
5	3.1 Sources and types of water pollution:			
	industrial discharge agricultural runoff urban			
	sewage.	1	6/10/18	SD
	Impacts on drinking water supplies, aquatic		0/10/18	JF
	ecosystems, and public health.			
	Water quality standards and monitoring	1	6/10/19	SD.
	techniques.	1	0/10/18	55
	Remediation technologies and pollution control	1	12/10/10	CD.
	measures.	L	13/10/18	58
		1	12/10/10	CD.
4	Integrated Water Energy Systems	1	13/10/18	5P
4	A 1 Weter for tarint and have been a super-	4 nr		
	4.1 Water footprint analysis in energy		24/44/40	6.5
	biofuels	1	24/11/18	SP
	1.2 Energy requirements for water treatment			
	distribution and desalination	1	24/11/18	SP
	4.3 Opportunities for synergistic solutions and			
	co-benefits	1	01/12/18	SP
	4.5 Case studies of integrated water-energy			
	projects and their effectiveness.	1	01/12/18	SP
5	Water Governance and Policy	4 hr		
	5.1 Role of governments, regulatory agencies,			
	and international institutions in water	1	19/1/19	SP
	management.		/ _/	
	5.2 Water rights, allocation mechanisms, and	1	19/1/19	SP
	pricing strategies.		-, -,	-
	5.3 Integrated water resources management	1	26/1/19	SP
	(IWRM) approaches.		, _, _,	
	5.4 Policy frameworks for addressing water	1	26/1/19	SP
	conflicts and promoting equitable access.	-	, _,	
6	Technological Innovations and Best Practices	4 hr		
	6.1 Water-saving technologies in agriculture,			
	industry, and households.	1	2/2/19	SD
	6.2 Advanced water treatment and reuse			
	techniques.	1	2/2/19	SD
	6.3 Nature-based solutions for water			
	conservation and ecosystem restoration.	1	9/2/19	SD
	0.4 Case studies of successful water management			
	miniatives nom around the world.	1	9/2/19	SD

7	Future Challenges and Opportunities			
	<ul><li>7.1 Emerging threats to water security: climate variability, population growth, urbanization.</li><li>7.2 Innovative approaches for addressing future</li></ul>	1	16/2/19	SP
	water crises.	1	16/2/19	SP
	<ul><li>7.3 Synergies between water and renewable</li><li>energy technologies.</li><li>7.4 Ethical considerations and social dimensions</li></ul>	1	23/2/19	SP
	of water governance.	1	23/2/19	SP
8	Final Project Presentation and Discussion	2hr		
	Students present their research projects or case studies on energy-water nexus issues Peer evaluation and feedback Discussion on practical implications and future directions for sustainable resource management		02/03/19	SD and SP

# SD (Sreoshi Dutta). SP – (Somnath Paul)

Date of examination: 09/03/19 (2 pm – 4 pm in MCQ mode).

#### **IQAC** recommendation

IQAC, Vivekananda College, Thakurpukur, met on 03 May 2019, to envisage, formulate, and design Add-On Courses, beyond the prescribed Curriculum.

A. It was decided that all the departments of Humanities, Science and Commerce would design and formulate 30 hour Add-On Courses for 2019-20 Academic calendar, as per UGC guidelines.

B. It was decided that the Departments would be free to choose the Courses based on their (subject) relevance, practicality, and feasibility.

C. It was decided that the Departments would have a Course Coordinator, who would design the Course and Course material in consultation with all teachers of the Department.

D. It was decided that each Department would design its format.

E. It was decided that the Departments would be encouraged to use and utilize their resources while formulating the Add-On Courses, rather than relying on Outsourcing.

F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.

kananda College sta.700.063



Ref. No.

Date 08.5.19

#### Notice

It is hereby notified that Vivekananda College, Thakurpukur, will offer Add-On Courses to All Honours students for the Academic year 2019-20.

Each Department will offer an Add-On Course as per UGC guidelines. Each Course will he structured & overseen hy a Course Coordinator, selected from the respective Department. Departmental Heads are requested to take up the matter on an urgent basis.

Principal Vivekananda College Thakurpukur Kol-63

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# VIVEKANANDA COLLEGE, THAKURPUKUR NOTICE

#### Department of Physics

A departmental meeting will be held on 15.05.2019 at 1:00 p.m. to discuss the below topics. All teachers are requested to kindly attend the meeting.

Agenda of the meeting:

- i) Introduction of Add-on course on "Python for Data Science" for UG Sem III and IV and UG 3<sup>rd</sup> Year Honoursstudents.
- Continuation of Add-on course of Previous year on "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management" for UG Sem I and Sem II students and.
- iii) Miscellaneous

HOD Department of Physics

## VIVEKANANDA COLLEGE, THAKURPUKUR DEPARTMENT OF PHYSICS

Resolution of the departmental meeting held on 15.05.2019

A)Teachers present in the meeting:

- 1Dr. Nirmalya Pahari
- 2. Dr. Arvind Pan
- 3. Dr. Kaushik Ghosh
- 4. Dr. Arunava Jha
- 5. Prof. Subhayan Biswas
- 6. Prof. Ambalika Biswas
- 7. Prof. Sreoshi Dutta
- 8. Prof. Somnath Paul
- 9. Sri DebasishChakraborty
- B) Minutes of the meeting
  - A. In the Departmental meeting dated 15/05/2019 the teachers of the Department of Physics unanimously decided that UG Sem III and IV and UG 3<sup>rd</sup> Year Honours students would be offered a 32-hour Add-on Course on "Python for Data Science". The other, that was introduced in the previous year "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management"will be continued to UG Sem I and II Honours students and PG Sem I and II students. It was also decided in the meeting that Dr. Arvind Pan and Prof. Subhayan Biswas of Department of Physics would be the Course Coordinator for the Add-On Course on "Python for Data Science" for the Academic session 2019-2020 and Prof. Sreoshi Dutta and Prof Somnath Paul of Department of Physics would be the Course Coordinator for the Add-On Course on "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management" for the Academic session 2019-2020.

Nirmahya Padani Anish Kaulik Ghul Aruman Tha. Subhayan Biscuas.

- Steashi Duttu
- Sommall' Paul. Sebaint closeduly

- B. The Course structure of the course on "Python for Data Science" submitted by Dr. Pan and Prof. Biswas was accepted by all teachers of the department.
- C. The Course structure of the course on "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management" will be same like the previous year.
- D. Certificates would be given to each student at the successful completion of the Course.
- E. The minimum attendance required for obtaining a completion certificate in the course is 75%.

To The Principal Vivekananda College, Thakurpukur, Kolkata 700063

Dear Sir,

I am writing to inform you that, this academic year, we are introducing two Add-on courses for our Honours and postgraduate students in our department.

All students from 2nd Year (Sem III and IV) and 3<sup>rd</sup> year will be participating in the "Python for Data Science" Add-on course. Additionally, all students from 3rd Year Honours, PG 1st Year (Sem I and II), will be enrolled in theAdd-on course "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management". These courses are scheduled to take place on Saturdays, utilizing the central computer facilities from 3:00 p.m. to 5:00 p.m. Your cooperation is highly appreciated. Thanking you,

Sincerely,

Arvind Pan Head of Department Department of Physics

Enclosure:

- 1. Resolution of the departmental meeting held on 15.05.2019
- 2. Proposal and Course structure for Introducing two Add-on Programs

### Proposal and Course Structure for Introducing Add-on Program onPython for Data Science

Data Science has become an integral part of our operations, enabling us to derive valuable insights, make informed decisions, and optimize our processes. The Python programming language has emerged as a prominent choice for data analysis, machine learning, and statistical modeling due to its versatility and extensive library support.

The primary objective of introducing this Python Add-on Program is to up skill our Students in the field of Data Science. They have some basic ideas of Python from their course. In this Add-on program students will gainproficiency in Python and relevant libraries (such as NumPy, Pandas, Matplotlib, and Scikit-learn), which will be better equipped to handle data-centric tasks, extract meaningful patterns, and contribute to data-driven decision-making.

The course curriculum of the program is given below.

# **Python forData Science**

Introduction to Data Science, Difference between, Artificial Intelligence, Machine Learning, Deep Learning, Data Science, software's needed for Hands on and their Installation

SL No	Content	Training in hrs (30 hrs)
1	Python Programming Introduction	1
2	Syntax, Comments, Variable, Data Types	1
3	Python String	2
4	Python Operators	1
5	List /Tuple /Sets /Dictionaries	2
6	If else/For Loop	2
7	Functions	2
8	Python Numpy	4
9	Python Pandas Basics	1
10	Python Data Cleaning /Missing Value / Fill-na	1
11	Values/Replace Value	1
12	Data Feature Eng. : Handling the Categorical Data	1
13	Data Feature Eng. :Data Validation	1
14	Data Feature Eng. :Removing Col. Raw Data	1
15	Machine Learning Introduction	1
16	Machine Learning Techniques	2
17	ML: Regression Algorithm	2
	1)Simple Linear2)Multiple Linear	
18	ML: Classification Algorithm	2
	1)Logistic Regression2)SVM Algo	
	3)KNN Algo4) Random Forest Algo	
19	ML: Unsupervised Algorithm	2
	1)Clustering Algorithm	

# **Python for Data Science**

(Add-on course class Routine)

SL	Content	Training	Date and	Teacher
No		in hrs (30	time(3 pm to	
		hrs)	4/5pm)	
1	Python Programming Introduction	1	06/07/2019	SB
2	Syntax, Comments, Variable, Data Types	1	06/07/2019	SB
3	Python String	2	13/07/2019	SB
4	Python Operators	1	20/07/2019	SB
5	List /Tuple /Sets /Dictionaries	2	27/07/2019	SB
6	If else/For Loop	2	03/08/2019	SB
7	Functions	2	10/08/2019	SB
8	Python Numpy	4	17/08/2019	AP
			31/08/2019	
9	Python Pandas Basics	1	07/09/2019	AP
10	Python Data Cleaning /Missing Value / Fill-na	1	07/09/2019	AP
11	Values/Replace Value	1	14/09/2019	AP
12	Data Feature Eng. :Handling the Categorical Data	1	14/09/2019	AP
13	Data Feature Eng. :Data Validation	1	21/09/2019	AP
14	Data Feature Eng. :Removing Col. Raw Data	1	21/09/2019	AP
15	Machine Learning Introduction	1	28/09/2019	AD
16	Machine Learning Techniques	2	09/10/2019	AD
17	ML: Regression Algorithm	2	16/10/2019	AD
	1)Simple Linear			
	2)Multiple Linear			
18	ML: Classification Algorithm	2	23/10/2019	AD
	1)Logistic Regression			
	2)SVM Algo			
	3)KNN Algo			
	4) Random Forest Algo			
19	ML: Unsupervised Algorithm	2	09/11/2019	AD
	1)Clustering Algorithm			

SB-Subhayan Biswas, AP-> Arvind Pan, AD->Anushree Das

Date of Examination 30/11/19 (3:00 pm to 5:00 pm -MCQ mode)

#### IQAC recommendation

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F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.

Whekananda College + sta.700 063



Ref. No.

Date 08.5.19

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#### NOTICE

#### Department of Physics

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Agenda of the meeting:

- i) To introduce Add-on course on "Python for Data Science" for UG Sem III and IV and UG 3<sup>rd</sup> Year Honours students.
- To continue the Add-on course of Previous year on "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management" for UG Sem I and Sem II students and.
- iii) Miscellaneous

HOD

# VIVEKANANDA COLLEGE, THAKURPUKUR DEPARTMENT OF PHYSICS

Resolution of the departmental meeting held on 15.05.2019

A)Teachers present in the meeting:

- 1.Dr. Nirmalya Pahari
- 2. Dr. Arvind Pan
- 3. Dr. Kaushik Ghosh
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- 5. Prof. Subhayan Biswas
- 6. Prof. Ambalika Biswas
- 7. Prof. Sreoshi Dutta
- 8. Prof. Somnath Paul
- 9. Sri DebasishChakraborty
- B) Minutes of the meeting

Nirmahya Pahari Aist Kamlik Ghal. Anonan The. Subbayan Biscuas. Sreashi Dutter Sommalh Paul. Debaint clobability

A. In the Departmental meeting dated 15/05/2019 the teachers of the Department of Physics unanimously decided that UG Sem III and IV and UG 3<sup>rd</sup> Year Honours students would be offered a 30-hour Add-on Course on "Python for Data Science". The other, which was introduced in the previous year "Energy and Water Crises in 21<sup>st</sup> Century: Challenges and Management"will be continued to UG Sem I and II Honours students and PG Sem I and II students. It was also decided in the meeting that Dr. Arvind Pan and Prof. Subhayan Biswas of Department of Physics would be the Course Coordinator for the Add-On Course on "Python for Data Science" for the Academic session 2019-2020 and Prof. Sreoshi Dutta and Prof Somnath Paul of Department of Physics would be the Course Coordinator for the Add-On Course on "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management" for the Academic session 2019-2020.

- B. The Course structure of the course on "Python for Data Science" submitted by Dr. Pan and Prof. Biswas was accepted by all teachers of the department.
- C. The Course structure of the course on "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management" will be same like the previous year.
- D. Certificates would be given to each student at the successful completion of the Course.
- E. The minimum attendance required for obtaining a completion certificate in the course is 75%.

To The Principal Vivekananda College, Thakurpukur, Kolkata 700063

Dear Sir,

I am writing to inform you that, this academic year, we are introducing two Add-on courses for our Honours and postgraduate students in our department.

All students from 2nd Year (Sem III and IV) and 3<sup>rd</sup> year will be participating in the "Python for Data Science" Add-on course. Additionally, all students from 3rd Year Honours, PG 1st Year (Sem I and II), will be enrolled in theAdd-on course "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management". These courses are scheduled to take place on Saturdays, utilizing the central computer facilities from 3:00 p.m. to 5:00 p.m. Your cooperation is highly appreciated. Thanking you,

Sincerely,

Arvind Pan Head of Department Department of Physics

Enclosure:

- 1. Resolution of the departmental meeting held on 15.05.2019
- 2. Proposal and Course structure for Introducing two Add-on Programs

## Proposal and Course structure of Add-on Program "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management".

This course delves into the interrelated challenges of energy and water crises, exploring their causes, impacts, and management strategies. It examines the complex interactions between energy production, water resources, and environmental sustainability, aiming to equip students with the knowledge and skills to address these critical issues effectively.

Course Objectives:

- To comprehend the interconnected nature of energy and water crises and their implications for society and the environment.
- To analyze the drivers and consequences of water scarcity and pollution.
- To explore integrated approaches for sustainable energy and water management.
- To evaluate policy frameworks, technological innovations, and best practices in addressing water and energy challenges.
- To foster critical thinking and interdisciplinary collaboration through case studies and practical exercises.

The course curriculum of the program is given below.

Sl	Content	Training in hrs
no.		(30 hr)
1	Introduction to Energy and Water Crises	4hr
	<ul><li>1.1 Overview of energy-water nexus: interdependencies and synergies.</li><li>1.2 Definitions and scope of water crises: scarcity, pollution</li></ul>	1
	access.	1
	<ul><li>environmental degradation.</li><li>1.4 Case studies highlighting the interconnected challenges of</li></ul>	1
	energy and water management.	1

2	Causes and Consequences of Water Scarcity	4 Hrs
	2.1 Factors contributing to water scarcity: population growth,	1
	climate change, urbanization.	
	2.2 Impacts on agriculture, industry, numan nealth, and ecosystem services.	1
	2.3 Water stress indicators and vulnerability assessments.	1
	2.4 Case studies of regions facing severe water shortages and their	1
	socio-economic ramifications	1
3	Water Pollution and Quality Management	4 Hrs
	3.1 Sources and types of water pollution: industrial discharge,	
	agricultural runoff, urban sewage.	1
	3.2 Impacts on drinking water supplies, aquatic ecosystems, and	
	3.3 Water quality standards and monitoring techniques	1
	3.4 Preventive technologies and pollution control measures	1
4	Integrated Water-Fnergy Systems	1 4 Hrs
-	A 1 Water footprint analysis in energy production: hydropower	- 1115
	thermoelectric plants biofuels	1
	4.2 Energy requirements for water treatment, distribution, and	-
	desalination.	1
	4.3 Opportunities for synergistic solutions and co-benefits.	1
	4.5 Case studies of integrated water-energy projects and their	1
	effectiveness.	
5	Water Governance and Policy	4 Hrs
	5.1 Role of governments, regulatory agencies, and international	
	institutions in water management.	1
	5.2 Water rights, allocation mechanisms, and pricing strategies.	1
	5.3 Integrated water resources management (IWRM) approaches.	1
	5.4 Policy frameworks for addressing water conflicts and	1
6	Technological Innevations and Dest Presting	
O	recimological innovations and Best Practices	4 115

	6.1 Water-saying technologies in agriculture, industry, and	
	households.	1
	6.2 Advanced water treatment and reuse techniques.	1
	6.3 Nature-based solutions for water conservation and ecosystem	
	restoration.	1
	6.4 Case studies of successful water management initiatives from	
	around the world.	1
7	Future Challenges and Opportunities	4 Hrs
	7.1 Emerging threats to water security: climate variability,	
	population growth, urbanization.	1
	7.2 Innovative approaches for addressing future water crises.	1
	7.3 Synergies between water and renewable energy technologies.	1
	7.4 Ethical considerations and social dimensions of water	
	governance.	1
8	Final Project Presentation and Discussion	2 Hrs
	Students present their research projects or case studies on energy-	
	water nexus issues	
	Peer evaluation and feedback	
	Discussion on practical implications and future directions for	
	sustainable resource management	

## (Add-on course class Routine)

SL	Content	Training	Date	Teacher
No		inhrs (30		
		hr)		
1	Introduction to Energy and Water Crises	4 hr		
	1.1 Overview of energy-water nexus:			
	interdependencies and synergies.	1	03/08/2019	SD
	1.2 Definitions and scope of water crises:			
	scarcity, pollution, access.	1	03/08/2019	SD
	1.3 Linkages between energy production, water		10/00/0010	65
	consumption, and environmental degradation.	1	10/08/2019	SD
	1.4 Case studies highlighting the interconnected			
	challenges of energy and water management.	1	10/08/2010	SD
2	Causes and Consequences of Water Security	1 4 h m	10/08/2019	50
Z	Causes and Consequences of water Scarcity	4 nr		
	2.1 Factors contributing to water scarcity:	1	17/08/2019	SD
	population growth, climate change, urbanization.			

	2.2 Impacts on agriculture, industry, human	1	17/08/2019	SD
	health, and ecosystem services.			
	2.3 Water stress indicators and vulnerability	1	31/08/2019	SD
	assessments.			
	2.4 Case studies of regions facing severe water	1	31/08/2019	SD
	shortages and their socio-economic ramifications			
3	Water Pollution and Quality Management	4hr		
	3.1 Sources and types of water pollution:			
	industrial discharge, agricultural runoff, urban			
	sewage.	1	07/09/2019	SP
	Impacts on drinking water supplies, aquatic			
	ecosystems, and public health.	1	14/09/2019	SP
	Water quality standards and monitoring			
	techniques.	1	14/09/2019	SP
	Remediation technologies and pollution control			
	measures.	1	21/09/2019	SP
4	Integrated Water-Energy Systems	4 hr		
	4.1 Water footprint analysis in energy			
	production: hydropower, thermoelectric plants,	1	28/09/2019	SP
	biofuels.			
	4.2 Energy requirements for water treatment,	1	28/09/2019	SP
	distribution, and desalination.		-,,	-
	4.3 Opportunities for synergistic solutions and	1	09/10/2019	SP
	co-benefits.	-	0072072020	0.
	4.5 Case studies of integrated water-energy	1	09/10/2019	SP
	projects and their effectiveness.	-	03/10/2013	51
5	Water Governance and Policy	4 hr		
	5.1 Role of governments, regulatory agencies,			
	and international institutions in water	1	16/10/2019	SP
	management.			
	5.2 Water rights, allocation mechanisms, and	1	16/10/2019	SP
	pricing strategies.			
	5.3 Integrated water resources management	1	23/10/2019	SP
	(IWRM) approaches.			
	5.4 Policy frameworks for addressing water	1	23/10/2019	SP
	conflicts and promoting equitable access.			
6	Technological Innovations and Best Practices	4 hr		
	0.1 water-saving technologies in agriculture,		00/11/10/00	
	industry, and nousenoids.	1	09/11/2019	SD
	0.2 Advanced water treatment and reuse			
	6.2 Noture based solutions for motor	1	09/11/2019	SD
	0.5 Induite-based solutions for water			
	6.4 Case studies of successful water management	1	16/11/2019	SD
	initiatives from around the world			
1		1	16/11/2019	SD

7	Future Challenges and Opportunities			
	<ul><li>7.1 Emerging threats to water security: climate variability, population growth, urbanization.</li><li>7.2 Innovative approaches for addressing future</li></ul>	1	23/11/2019	SP
	water crises. 7.3 Synergies between water and renewable	1	23/11/2019	SP
	energy technologies. 7.4 Ethical considerations and social dimensions	1	30/11/2019	SP
	of water governance.	1	15/02/2020	SP
8	Final Project Presentation and Discussion	2hr		
	Students present their research projects or case studies on energy-water nexus issues Peer evaluation and feedback Discussion on practical implications and future directions for sustainable resource management		22/02/2020	SP and SD

# SD (Sreoshi Dutta). SP Somnath Paul

Date of examination: 29/02/2020 (2pm – 4pm in MCQ mode).

#### IQAC recommendation

IQAC, Vivekananda College, Thakurpukur, met on 14/Sept/2021, to envisage, formulate and design Add-On Courses, beyond prescribed Curriculum

A. It was decided that all the departments of Humanities, Science and Commerce would design and formulate 30 hour Add-On Courses for the session 2021-22, Academic calendar, as per UGC guidelines.

8. It was decided that the Departments would be free to choose the Courses on the basis of their (subject) relevance, practicality and feasibility.

C. It was decided that the Departments would have a Course Coordinator, who would design the Course and Course materials, in consultation with all teachers of the Department.

D. It was decided that each Department would design its own format; and could follow a blended mode of instruction.

E. It was decided that the Departments would be encouraged to use and utilize their own resources while formulating the Add-On Courses, rather than relying on Outsourcing.

F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.

Lo-ordinator IQAC Vivekananda College Kolkata-700 063



# VIVEKANANDA COLLEGE (GOVT. SPONSORED) (NAAC ACCREDITED GRADE 'A')

Ref. No ...

Date 21/9/21

#### Notice

It is hereby notified that Vivekananda College, Thakurpukur, will offer Add-On Courses to All Honours students for the Academic year 2021- 22.

Each Department will offer an Add-On Course as per UGC guidelines. Each Course will be structured & overseen by a Course Coordinator, selected from the respective Department. Departmental Heads are requested to take up the matter on an urgent basis.

Principal Weeksmenda College Thakupukur, Kol-63

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063

## VIVEKANANDA COLLEGE, THAKURPUKUR NOTICE

#### Department of Physics

Adepartmental meeting will be held on 28.09.2021 at 1:00 p.m. to discuss the below topics. All teachers are requested to attend the meeting kindly.

Agenda of the meeting:

- i) Tocontinuethe Add-on course on "Python for Data Science" for UG Sem V and VI; and PG Sem III and IV students.
- To continue the Add-on course on "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management" for UG Sem I and II; UG SemIII and Sem IVHonours students and PG Sem I and II students.
- iii) Miscellaneous

Nirmalya Pakari

HOD

### VIVEKANANDA COLLEGE, THAKURPUKUR DEPARTMENT OF PHYSICS

Resolution of the departmental meeting held on 28.09.2021

A)Teachers present in the meeting:

- 1. Dr. Nirmalya Pahari
- 2. Dr. Arvind Pan
- 3. Dr. Kaushik Ghosh
- 4. Dr. Arunava Jha
- 5. Prof. Subhayan Biswas
- 6. Prof. Somnath Paul
- 7. Sri Debasish Chakraborty
- B) Minutes of the meeting
  - A. In the Departmental meeting dated 28.09.2021 the teachers of the Department of Physics unanimously decided that the for UG Sem V and VI; and PG Sem III and IV studentswould be offered a 32-hour Add-on Course on "Python for Data Science". Another 32-hour Add-on course on "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management" will be offered to UG Sem I and II; UG SemIII and Sem IVHonours students and PG Sem I and II students. It was also decided in the meeting that Dr. Arvind Pan and Prof. Subhayan Biswas of Department of Physics would be the Course Coordinator for the Add-On Course on "Python for Data Science" for the Academic session 2021-2022 and Dr. Nirmalya Pahariand Somnath Paul of Department of Physics would be the Course Coordinator for the Add-On Course on "Python for Data Science" for the Add-On Course on "Python for Data Science" for the Academic session 2021-2022 and Dr. Nirmalya Pahariand Somnath Paul of Department of Physics would be the Course Coordinator for the Add-On Course on "Python for Data Science" for the Add-On Course on Science Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics would be the Course Coordinator for the Add-On Course on Physics Physics Physics Physics Physics Physics Physics Physics Physics Phy

Nirmalya Padani <u>L</u> Kamlik Ghul. Animan Tha Subhayan Bisewas. Sommath Paul. Sebaint clobabily

"Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management" for the Academic session 2020-2021.

- B. It is also resolved that the Course structure on "Python for Data Science" and "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management" will be the same as the previous year and will be conducted in online and offline mode.
- C. Certificates would be given to each student at the successful completion of the Course.
- D. The minimum attendance required for obtaining a completion certificate in the course is 75%.

To The Principal Vivekananda College, Thakurpukur, Kolkata 700063

Dear Sir,

I am writing to inform you that, we are offering two Add-on courses for our Honours and postgraduate students of our department.

TheUG Sem V and VI; and PG Sem III and IV studentswill be participating in the "Python for Data Science" Add-on course. UG Sem I and II; UG SemIII and Sem IVHonours students and PG Sem I and II students will be enrolled in the "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management" Add-on course. These courses will be held in the online and offline mode.

Sincerely,

Nirmalya Palari

Nirmalya Pahari Head of Department Department of Physics

Enclosure:

- 1. Resolution of the departmental meeting held on 28.09.2021
- 2. Proposal and Course structure for Introducing two Add-on Programs

### Proposal and Course structure for Introducing Add-on Program onPython for Data Science

Data Science has become an integral part of our operations, enabling us to derive valuable insights, make informed decisions, and optimize our processes. The Python programming language has emerged as a prominent choice for data analysis, machine learning, and statistical modeling due to its versatility and extensive library support.

The primary objective of introducing this Python Add-on Program is to up skill our Students in the field of Data Science. They have some basic ideas of Python from their course. In this Add-on program students will gainproficiency in Python and relevant libraries (such as NumPy, Pandas, Matplotlib, and Scikit-learn), which will be better equipped to handle data-centric tasks, extract meaningful patterns, and contribute to data-driven decision-making.

The course curriculum of the program is given below.

# **Python forData Science**

Introduction to Data Science, Difference between, Artificial Intelligence, Machine Learning, Deep Learning, Data Science, software's needed for Hands on and their Installation

SL No	Content	Training in hrs (30 hrs)
1	Python Programming Introduction	1
2	Syntax, Comments, Variable, Data Types	1
3	Python String	2
4	Python Operators	2
5	List /Tuple /Sets /Dictionaries	2
6	If else/For Loop	2
7	Functions	2
8	Python Numpy	4
9	Python Pandas Basics	1
10	Python Data Cleaning /Missing Value / Fill-na	1
11	Values/Replace Value	1
12	Data Feature Eng. : Handling the Categorical Data	1
13	Data Feature Eng. :Data Validation	1
14	Data Feature Eng. : Removing Col. Raw Data	1
15	Machine Learning Introduction	1
16	Machine Learning Techniques	1
17	ML: Regression Algorithm	2
	1)Simple Linear2)Multiple Linear	
18	ML: Classification Algorithm	2
	1)Logistic Regression2)SVM Algo	
	3)KNN Algo4) Random Forest Algo	
19	ML: Unsupervised Algorithm	2
	1)Clustering Algorithm	

# **Python for Data Science**

(Add-on course class Routine)

SL	Content	Training	Date and	Teacher
No		in hrs (30	time(3 pm to	
		hrs)	4/5pm)	
1	Python Programming Introduction	1	03/01/22	SB
2	Syntax, Comments, Variable, Data Types	1	03/01/22	SB
3	Python String	2	04/01/22	SB
4	Python Operators	2	05/01/22	SB
5	List /Tuple /Sets /Dictionaries	2	06/01/22	SB
6	If else/For Loop	2	08/01/22	SB
7	Functions	2	10/01/22	SB
8	Python Numpy	4	12/01`/22	AP
			18/01/22	
9	Python Pandas Basics	1	20/01/22	AP
10	Python Data Cleaning /Missing Value / Fill-na	1	20/01/22	AP
11	Values/Replace Value	1	21/01/22	AP
12	Data Feature Eng. :Handling the Categorical Data	1	21/01/22	AP
13	Data Feature Eng. :Data Validation	1	22/01/22	AP
14	Data Feature Eng. :Removing Col. Raw Data	1	22/01/22	AP
15	Machine Learning Introduction	1	23/01/22	AD
16	Machine Learning Techniques	1	23/01/22	AD
17	ML: Regression Algorithm	2	25/01/22	AD
	1)Simple Linear			
	2)Multiple Linear			
18	ML: Classification Algorithm	2	28/01/22	AD
	1)Logistic Regression			
	2)SVM Algo			
	3)KNN Algo			
	4) Random Forest Algo			
19	ML: Unsupervised Algorithm	2	29/01/22	AD
	1)Clustering Algorithm			

SB-Subhayan Biswas, AP-> Arvind Pan, AD-> Anushree Das

Date of Examination 12/02/22 (3:00 pm to 5:00 pm -MCQ mode)

#### IQAC recommendation

IQAC, Vivekananda College, Thakurpukur, met on 14/Sept/2021, to envisage, formulate and design Add-On Courses, beyond prescribed Curriculum

A. It was decided that all the departments of Humanities, Science and Commerce would design and formulate 30 hour Add-On Courses for the session 2021-22, Academic calendar, as per UGC guidelines.

 It was decided that the Departments would be free to choose the Courses on the basis of their (subject) relevance, practicality and feasibility.

C. It was decided that the Departments would have a Course Coordinator, who would design the Course and Course materials, in consultation with all teachers of the Department.

D. It was decided that each Department would design its own format; and could follow a blended mode of instruction.

E. It was decided that the Departments would be encouraged to use and utilize their own resources while formulating the Add-On Courses, rather than relying on Outsourcing.

F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.

Lo-ordinator I Q A C Vivekananda College Kolkata-700 063



# VIVEKANANDA COLLEGE (GOVT. SPONSORED) (NAAC ACCREDITED GRADE 'A')

Ref. No.

Date 21/9/21

#### Notice

It is hereby notified that Vivekananda College, Thakurpukur, will offer Add-On Courses to All Honours students for the Academic year 2021- 22.

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Principal Weeksmends Cotege That uppeter, Kol-63

269, DIAMOND HARBOUR ROAD, THAKURPUKUR, KOLKATA- 700 063

#### VIVEKANANDA COLLEGE, THAKURPUKUR

#### NOTICE

#### Department of Physics

A departmental meeting will be held on 28.09.2021 at 1:00 p.m. to discuss the below topics. All teachers are requested to attend the meeting kindly.

Agenda of the meeting:

- i) To continue the Add-on course on "Python for Data Science" for UG Sem V and VI; and PG Sem III and IV students.
- To continue the Add-on course on "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management" for UG Sem I and II; UG SemIII and Sem IVHonours students and PG Sem I and II students.
- iii) Miscellaneous

Nirmalya Pakari

HOD

# VIVEKANANDA COLLEGE, THAKURPUKUR

#### **DEPARTMENT OF PHYSICS**

Resolution of the departmental meeting held on 28.09.2021

A)Teachers present in the meeting:

- 1. Dr. Nirmalya Pahari
- 2. Dr. Arvind Pan
- 3. Dr. Kaushik Ghosh
- 4. Dr. Arunava Jha
- 5. Prof. Subhayan Biswas
- 6. Prof. Somnath Paul
- 7. Sri Debasish Chakraborty
- B) Minutes of the meeting

Nirmalya Padani Anila Kamlik Ghul. Aruman Tha. Subhayan Bisevas. Sommalh Paul. Sebaint cloudely

- A. In the Departmental meeting dated 28.09.2021 the teachers of the Department of Physics unanimously decided that the for UG Sem V and VI; and PG Sem III and IV students would be offered a 32-hour Add-on Course on "Python for Data Science". Another 32-hour Add-on course on "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management" will be offered to UG Sem I and II; UG SemIII and Sem IVHonours students and PG Sem I and II students. It was also decided in the meeting that Dr. Arvind Pan and Prof. Subhayan Biswas of Department of Physics would be the Course Coordinator for the Add-On Course on "Python for Data Science" for the Academic session 2021-2022 and Dr. Nirmalya Pahariand Prof Somnath Paul of Department of Physics would be the Course Coordinator for the Add-On Course on "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management" for the Academic session 2020-2021.
- B. It is also resolved that the Course structure on "Python for Data Science" and "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management" will be the same as the previous year and will be conducted in online and offline mode.
- C. Certificates would be given to each student at the successful completion of the Course.
- D. The minimum attendance required for obtaining a completion certificate in the course is 75%.

To The Principal Vivekananda College, Thakurpukur, Kolkata 700063

Dear Sir,

I am writing to inform you that, we are offering two Add-on courses for our Honours and postgraduate students of our department.

TheUG Sem V and VI; and PG Sem III and IV students will be participating in the "Python for Data Science" Add-on course. UG Sem I and II; UG SemIII and Sem IVHonours students and PG Sem I and II students will be enrolled in the "Energy and Water Crises in 21<sup>st</sup>Century: Challenges and Management " Add-on course. These courses will be held in the online and offline mode.

Sincerely,

Nirmalya Pakan'

Nirmalya Pahari Head of Department Department of Physics

Enclosure:

- 1. Resolution of the departmental meeting held on 28.09.2021
- 2. Proposal and Course structure for Introducing two Add-on Programs

# Proposal and Course structure of Add-on Program "Energy and Water Crises in 21<sup>st</sup> century: Challenges and Management".

This course delves into the interrelated challenges of energy and water crises, exploring their causes, impacts, and management strategies. It examines the complex interactions between energy production, water resources, and environmental sustainability, aiming to equip students with the knowledge and skills to address these critical issues effectively.

Course Objectives:

- To comprehend the interconnected nature of energy and water crises and their implications for society and the environment.
- To analyze the drivers and consequences of water scarcity and pollution.
- To explore integrated approaches for sustainable energy and water management.
- To evaluate policy frameworks, technological innovations, and best practices in addressing water and energy challenges.
- To foster critical thinking and interdisciplinary collaboration through case studies and practical exercises.

The course curriculum of the program is given below.

Sl	Content	Training in hrs
no.		(30 hr)
1	Introduction to Energy and Water Crises	4hr
	<ul> <li>1.1 Overview of energy-water nexus: interdependencies and synergies.</li> <li>1.2 Definitions and scope of water crises: scarcity, pollution, access.</li> <li>1.3 Linkages between energy production, water consumption, and environmental degradation.</li> <li>1.4 Case studies highlighting the interconnected challenges of energy and water management.</li> </ul>	1 1 1 1

2	Causes and Consequences of Water Scarcity	4 Hrs
	2.1 Factors contributing to water scarcity: population growth, climate change, urbanization.	1
	2.2 Impacts on agriculture, industry, human health, and ecosystem	
	services.	1
	2.3 Water stress indicators and vulnerability assessments.	1
	2.4 Case studies of regions facing severe water shortages and their	
	socio-economic ramifications	1
3	Water Pollution and Quality Management	4 Hrs
	3.1 Sources and types of water pollution: industrial discharge,	
	agricultural runoff, urban sewage.	1
	3.2 Impacts on drinking water supplies, aquatic ecosystems, and	
	public health.	1
	3.3 Water quality standards and monitoring techniques.	1
	3.4 Preventive technologies and pollution control measures.	1
4	Integrated Water-Energy Systems	4 Hrs
	4.1 Water footprint analysis in energy production: hydropower,	
	thermoelectric plants, biofuels.	1
	4.2 Energy requirements for water treatment, distribution, and	
	desalination.	1
	4.3 Opportunities for synergistic solutions and co-benefits.	1
	4.5 Case studies of integrated water-energy projects and their	1
	effectiveness.	
5	Water Governance and Policy	4 Hrs
	5.1 Role of governments, regulatory agencies, and international	
	institutions in water management.	1
	5.2 Water rights, allocation mechanisms, and pricing strategies.	1
	5.3 Integrated water resources management (IWRM) approaches.	1
	5.4 Policy frameworks for addressing water conflicts and	1
	promoting equitable access.	
6	Technological Innovations and Best Practices	4 Hrs
	6.1 Water-saving technologies in agriculture, industry, and	
	households.	
	6.2 Advanced water treatment and reuse techniques.	
	0.5 Nature-based solutions for water conservation and ecosystem	
	restoration.	1
	around the world	
		1
1		1

7	Future Challenges and Opportunities	4 Hrs
	7.1 Emerging threats to water security: climate variability,	
	population growth, urbanization.	1
	7.2 Innovative approaches for addressing future water crises.	1
	7.3 Synergies between water and renewable energy technologies.	1
	7.4 Ethical considerations and social dimensions of water	
	governance.	1
8	Final Project Presentation and Discussion	2 Hrs
	Students present their research projects or case studies on energy-	
	water nexus issues	
	Peer evaluation and feedback	
	Discussion on practical implications and future directions for	
	sustainable resource management	

# (Add-on course class Routine)

SL	Content	Training	Date	Teacher
No		innrs (30 nr)		
1	Introduction to Energy and Water Crises	4 hr		
	1.1 Overview of energy-water nexus:			
	interdependencies and synergies.	1	3/1/22	AD
	1.2 Definitions and scope of water crises:			
	scarcity, pollution, access.	1	3/1/22	AD
	1.3 Linkages between energy production, water			
	consumption, and environmental degradation.	1	04/1/22	AD
	1.4 Case studies highlighting the interconnected			
	challenges of energy and water management.	1	04/1/22	AD
2	<b>Causes and Consequences of Water Scarcity</b>	4 hr		
	2.1 Factors contributing to water scarcity:	1	05/1/22	AD
	population growth, climate change, urbanization.			
	2.2 Impacts on agriculture, industry, human			
	health, and ecosystem services.		05/1/22	
	2.3 Water stress indicators and vulnerability	1		AD
	assessments.		06/1/22	
	2.4 Case studies of regions facing severe water	1		AD
	snortages and their socio-economic ramifications		06/1/22	
		1		AD

3	Water Pollution and Quality Management	4hr		
-	3.1 Sources and types of water pollution:	1	08/1/22	SP
	industrial discharge, agricultural runoff, urban			
	sewage.			
	Impacts on drinking water supplies, aquatic	1	08/1/22	SP
	ecosystems, and public health.			
	Water quality standards and monitoring	1	10/1/22	SP
	techniques.			
	Remediation technologies and pollution control	1	10/1/22	SP
	measures.			
4	Integrated Water-Energy Systems	4 hr		
	4.1 Water footprint analysis in energy			
	production: hydropower, thermoelectric plants,	1	12/1/22	SP
	biofuels.			
	4.2 Energy requirements for water treatment,	1	12/1/22	SP
	distribution, and desalination.			
	4.3 Opportunities for synergistic solutions and	1	18/1/22	SP
	co-benefits.		, _,	
	4.5 Case studies of integrated water-energy	1	18/1/22	SP
	projects and their effectiveness.	-	, _,	•
5	Water Governance and Policy	4 hr		
	5.1 Role of governments, regulatory agencies,			
	and international institutions in water	1	20/1/22	SP
	management.		-, ,	_
	5.2 Water rights, allocation mechanisms, and	1	20/1/22	SP
	pricing strategies.		-, ,	_
	5.3 Integrated water resources management	1	21/1/22	SP
	(IWRM) approaches.		, ,	_
	5.4 Policy frameworks for addressing water	1	21/1/22	SP
	conflicts and promoting equitable access.		, _,	
6	Technological Innovations and Best Practices	4 hr		
	6.1 Water-saving technologies in agriculture,			
	industry, and households.	1	22/1/22	AD
	6.2 Advanced water treatment and reuse		, ,	
	techniques.	1	22/1/22	AD
	6.3 Nature-based solutions for water		, _,	
	conservation and ecosystem restoration.	1	23/1/22	AD
	6.4 Case studies of successful water management	_	/ _/	
	initiatives from around the world.	1	23/1/22	AD
			, -,	

7	Future Challenges and Opportunities			
	<ul><li>7.1 Emerging threats to water security: climate variability, population growth, urbanization.</li><li>7.2 Innovative approaches for addressing future</li></ul>	1	25/1/22	SP
	water crises.	1	25/1/22	SP
	<ul><li>energy technologies.</li><li>7.4 Ethical considerations and social dimensions</li></ul>	1	28/1/22	SP
	of water governance.	1	28/1/22	SP
8	<b>Final Project Presentation and Discussion</b>	2hr		
	Students present their research projects or case studies on energy-water nexus issues Peer evaluation and feedback Discussion on practical implications and future directions for sustainable resource management		29/01/22	AD and SP

# AD (Anushree Das). SP (Somnath Paul).

Date of examination: 12/02/22 (2pm – 4pm in MCQ mode).

#### **IQAC** recommendation

IQAC, Vivekananda College, Thakurpukur, met on 18/June/2022, to envisage, formulate and design Add-On Courses, beyond prescribed Curriculum. The IQAC has also decided to organise a program on staff training:

- A. It was decided that all the departments of Humanities, Science and Commerce would design and formulate 30 hour Add-On Courses for 2022-23, Academic calendar, as per UGC guidelines.
- B. It was decided that the Departments would be free to choose the Courses on the basis of their (subject) relevance, practicality and feasibility.
- C. It was decided that the Departments would have a Course Coordinator, who would design the Course and Course materials, in consultation with all teachers of the Department.
- D. It was decided that each Department would design their own format; and could follow a blended mode of instruction.
- E. It was decided that the Departments would be encouraged to use and utilize their own resources while formulating the Add-On Courses, rather than relying on Outsourcing.
- F. IQAC would send its recommendations to the Principal/TIC for perusal and implementation.
- G. The IQAC would also organise a Staff Training programme 'Effective Working Style 'Conducted by IPE Of Professional Excellence On 25th June 2022.

Lo-ordinator I Q A C Vivekananda College Kolkata-700 063



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## VIVEKANANDA COLLEGE, THAKURPUKUR NOTICE

#### Department of Physics

A departmental meeting will be held on 11.07.2022 at 1:00 p.m. to discuss on the topics mentioned below. All teachers are requested to kindly attend the meeting.

Agenda of the meeting:

- i) Introduction of Add-on course on "Python for Data Science" for UG Sem I and II and UG Sem III and IV Honours students.
- ii) Introduction of Add-on course on "Advanced learning tools for Scientific Project and Research paper writing" for UG Sem V and VI Honours students and PG Sem I and II ; Sem III and IV PG students
- iii) Miscellaneous

Nirmalya Padari

HOD

## VIVEKANANDA COLLEGE, THAKURPUKUR DEPARTMENT OF PHYSICS

Resolution of the departmental meeting held on 11.07.2022

A)Teachers present in the meeting:

- 1. Dr. Nirmalya Pahari
- 2. Dr. Arvind Pan
- 3. Dr. Kaushik Ghosh
- 4. Dr. Arunava Jha
- 5. Prof. Subhayan Biswas
- 6. Prof. Somnath Paul
- 7. Sri Debasish Chakraborty
- B) Minutes of the meeting

Nirmalya Padari Anilta Kamlik Ghul. Subhayan Biscons. Sommalh Paul. Debaint clobaby

- A. In the Departmental meeting dated 11/07/2022 the teachers of the Department of Physics unanimously decided that the Sem I and II, Sem III and IV, Honours students would be offered a 30-hour Add-on Course on "Python for Data Science". Another 30-hour Add-on course on "Advanced learning tools for Scientific Project and Research paper writing" will be offered to UG Sem V and VI Honours students and PG Sem I and II; Sem III and IV PG students. It was also decided in the meeting that Dr. Arvind Pan and Prof. Subhayan Biswas of Department of Physics would be the Course Coordinator for the Add-On Course on "Python for Data Science" for the Academic session 2022-2023 and Dr. Kaushik Ghosh and Prof. Subhayan Biswas of Department of Physics would be the Course Coordinator for the Add-On Course on "Advanced Learning Tools for Scientific Project and Research Paper Writing" for the Academic session 2022-2023.
- B. The Course structure of the course on "Python for Data Science" submitted by Dr. Pan and Prof. Biswas was accepted by all teachers of the department.

- C. The Course structure of the course on "Advanced learning tools for Scientific Project and Research paper writing"submitted by Dr. Ghosh and Prof. Biswas was accepted by all teachers of the department.
- D. Certificates would be given to each student at the successful completion of the Course.

To The Principal Vivekananda College, Thakurpukur, Kolkata 700063

Dear Sir,

I am writing to inform you that, starting this academic year, we are introducing two Add-on courses for our Honours and postgraduate students in our department.

Approximately sixty students from 1st Year (Sem I and II) and 2nd Year (Sem III and IV) will be participating in the "Python for Data Science" Add-on course. Additionally, around thirty students from 3rd Year (Sem V and VI) Honours, PG 1st Year (Sem I and II), and PG 2nd Year (Sem III and IV) will be enrolled in the "Advanced Learning Tools for Scientific Project and Research Paper Writing" Add-on course. These courses are scheduled to take place on Saturdays, utilizing the central computer facilities from 12:45 p.m. to 2:45 p.m. and 3:00 p.m. to 5:00 p.m. Your cooperation is highly appreciated. Thanking you,

Sincerely,

Nirmalya Pakari

Nirmalya Pahari Head of Department Department of Physics

Enclosure:

- 1. Resolution of the departmental meeting held on 11.07.2022
- 2. Proposal and Course structure for Introducing two Add-on Programs

# **Proposal and Course structure for Introducing Add-on Program on**"Advanced learning tools for Scientific Project and Research paper writing"

Scientific projects and research paper writing stand as the bedrock of advancements in knowledge, innovation, and societal progress. In the dynamic landscape of academia and scientific inquiry, these endeavors play a pivotal role in shaping our understanding of the world around us. The importance of engaging in scientific projects and crafting research papers cannot be overstated, as they serve as the linchpin for intellectual growth, the evolution of technologies, and the development of solutions to pressing global challenges.

Scientific projects and research paper writing also contribute to the education and development of future scientists, engineers, and scholars. Engaging in such endeavors cultivates essential skills such as problem-solving, data analysis, and effective communication. Moreover, it instills a sense of intellectual rigor and perseverance, essential qualities for navigating the complexities of a rapidly advancing world.

The primary objective of introducing this Advanced learning tools for Scientific Project and Research paper writing Add-on Program is to up skill our Students in the field of research will able to share their insights, methodologies, and results with the global scientific community. They have some basic ideas of Latex from their course. In this Add-on program students will gainproficiency in Mathematica and Origin along with Latex (such as Data and graph visualization, theoretical representation of some experimental results etc.), which will be better equipped to handle equations, graphs and data.

The course curriculum of the program is given below.

# Advanced learning tools for Scientific Project and Research paper writing

Introduction to Mathematica for problem solving, Origin for advance graph plots and advance document planning by Latex with software's needed for Hands on and their Installation.

SL No	Content	Training in hrs (32 hr)
	Scientific writing with Latex	10
1	1.1 Document Structure and Page Layout	1
	1.2 Paragraph Formatting	1
	1.3 Errors and Warnings and user packages	1
	1.4 Bibliography Management	1
	1.5 Tables	1
	1.6 Importing Graphics	1
	1.7 Floats, Figures and Captions	1
	1.8 Mathematics	1
	1.9 Advanced Mathematics	1
	1.10 Writing your document	1
2	Plotting by Origin	05
	2.1 Introduction to Graphing	1
	2.2 Data Exploration and Exploratory Analysis	1
	2.3 Curve and Surface Fitting	1
	2.4 <u>Mathematics</u>	1
	2.5 Programming and Connectivity	1
3	Mathematica (Science is tough, though calculations are easy)	15
	Basics	
	3.1 Structure of Mathematica.	1
	3.2 Interactive Use of Mathematica.	1
	3.3 Symbolic Calculations.	1
	3.4 Numerical Calculations.	1
	3.5 Graphics.	1
	3.6 Functional Programming.	2
	3.7 String and Text Processing.	2
	3.8 Two-Dimensional Graphics and Plots.	2
	3.9 Three-Dimensional Plots and Graphics.	2
	3.10 Science and Engineering.	2

# Advanced learning tools for Scientific Project

# and Research paper writing

SL	Content	Training in	Date and time(3	Teacher
No		hrs (32 hrs)	pm to 4/5pm)	
1	Scientific writing with Latex	10		
1.1 Document Structure and Page Layout		1	5/11/22	KG
1.2 Paragraph Formatting		1	5/11/22	KG
1.3 Errors and Warnings and user packages		1	12/11/22	KG
1.4 Bibliography Management		1	12/11/22	KG
1.5 Tables		1	19/11/22	KG
1.6 Importing Graphics		1	19/11/22	KG
1.7 Floats, Figures and Captions		1	26/11/22	KG
1.8 Mathematics		1	26/11/22	KG
1.9 A	dvanced Mathematics	1	03/12/22	KG
1.10 Writing your document		1	03/12/22	KG
2 Plotting by Origin		5		
2.1 In	troduction to Graphing	1	10/12/22	AJ
2.2 Data Exploration and Exploratory Analysis		1	10/12/22	AJ
2.3 Curve and Surface Fitting		1	17/12/23	AJ
2.4 Mathematics		1	17/12/23	AJ
2.5 Programming and Connectivity		1	07/01/23	AJ
3	Mathematica	15		
Basics				
1.1 Structure of Mathematica.		1	14/01/23	SB
1.2 Interactive Use of Mathematica.		1	14/01/23	SB
1.3 Symbolic Calculations.		1	01/04/23	SB
1.4 Numerical Calculations.		1	01/04/23	SB
1.5 Graphics.		1	08/04/23	SB
1.6 Functional Programming.		2	22/04/23	SB
1.7 String and Text Processing.		2	29/04/23	SB
1.8 Two-Dimensional Graphics and Plots.		2	06/05/23	SB
1.9 Three-Dimensional Plots and Graphics.		2	13/05/23	SB
1.10 Science and Engineering.		2	20/05/23	SB

•

(Add-on course class Routine)

SB => Subhayan Biswas, AJ => Arunava Jha, KG =>Kaushik Ghosh

Date of Examination 27/05/23 (12:45 pm to 2:45 pm -MCQ mode)

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Nirmalya Padari

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Nirmalya Padari nista Kamlik Ghal Areman The. Suphayan Bisevas. Sommeth Paul. Sebaint clobabaly

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Nirmalya Padari

Nirmalya Pahari Head of Department Department of Physics

Enclosure:

- 1. Resolution of the departmental meeting held on 11.07.2022
- 2. Proposal and Course structure for Introducing two Add-on Programs

### Proposal and Course structure for Introducing Add-on Program onPython for Data Science

Data Science has become an integral part of our operations, enabling us to derive valuable insights, make informed decisions, and optimize our processes. The Python programming language has emerged as a prominent choice for data analysis, machine learning, and statistical modeling due to its versatility and extensive library support.

The primary objective of introducing this Python Add-on Program is to up skill our Students in the field of Data Science. They have some basic ideas of Python from their course. In this Add-on program students will gainproficiency in Python and relevant libraries (such as NumPy, Pandas, Matplotlib, and Scikit-learn), which will be better equipped to handle data-centric tasks, extract meaningful patterns, and contribute to data-driven decision-making.

The course curriculum of the program is given below.

# **Python forData Science**

Introduction to Data Science, Difference between, Artificial Intelligence, Machine Learning, Deep Learning, Data Science, software's needed for Hands on and their Installation

SL No	Content	Training in hrs (30 hrs)
1	Python Programming Introduction	1
2	Syntax, Comments, Variable, Data Types	1
3	Python String	2
4	Python Operators	1
5	List /Tuple /Sets /Dictionaries	2
6	If else/For Loop	2
7	Functions	2
8	Python Numpy	4
9	Python Pandas Basics	1
10	Python Data Cleaning / Missing Value / Fill-na	1
11	Values/Replace Value	1
12	Data Feature Eng. : Handling the Categorical Data	1
13	Data Feature Eng. :Data Validation	1
14	Data Feature Eng. :Removing Col. Raw Data	1
15	Machine Learning Introduction	1
16	Machine Learning Techniques	2
17	ML: Regression Algorithm	2
	1)Simple Linear2)Multiple Linear	
18	ML: Classification Algorithm	2
	1)Logistic Regression2)SVM Algo	
	3)KNN Algo4) Random Forest Algo	
19	ML: Unsupervised Algorithm	2
	1)Clustering Algorithm	

# **Python for Data Science**

(Add-on course class Routine)

SL	Content	Training	Date and	Teacher
No		in hrs (30	time(3 pm to	
		hrs)	4/5pm)	
1	Python Programming Introduction	1	5/11/22	SB
2	Syntax, Comments, Variable, Data Types	1	5/11/22	SB
3	Python String	2	12/11/22	SB
4	Python Operators	1	19/11/22	SB
5	List /Tuple /Sets /Dictionaries	2	26/11/22	SB
6	If else/For Loop	2	03/12/22	SB
7	Functions	2	10/12/22	SB
8	Python Numpy	4	17/12/23	AP
			07/01/23	
9	Python Pandas Basics	1	14/01/23	AP
10	Python Data Cleaning /Missing Value / Fill-na	1	01/04/23	AP
11	Values/Replace Value	1	01/04/23	AP
12	Data Feature Eng. :Handling the Categorical Data	1	08/04/23	AP
13	Data Feature Eng. :Data Validation	1	08/04/23	AP
14	Data Feature Eng. :Removing Col. Raw Data	1	22/04/23	AP
15	Machine Learning Introduction	1	22/04/23	AD
16	Machine Learning Techniques	2	29/04/23	AD
17	ML: Regression Algorithm	2	06/05/23	AD
	1)Simple Linear			
	2)Multiple Linear			
18	ML: Classification Algorithm	2	13/05/23	AD
	1)Logistic Regression			
	2)SVM Algo			
	3)KNN Algo			
	4) Random Forest Algo			
19	ML: Unsupervised Algorithm	2	20/05/23	AD
	1)Clustering Algorithm			

SB-Subhayan Biswas, AP-> Arvind Pan, AD-> Anushree Das

Date of Examination 27/05/23 (3:00 pm to 5:00 pm -MCQ mode)