

# GOA UNIVERSITY SCHOOL OF CHEMICAL SCIENCES (SCS)

## VALUE ADDED COURSE (30 hours)

### CHCS-501: Laboratory safety, first aid and waste management (A course on transferable life skills)

Course duration: Nov 2022 – Apr 2023 (Saturday, 10:00am-12:00noon)

Venue: LH-1 classroom, SCS

This course is optional, and offered outside the curriculum, that adds value to the holistic development of the students.

## Prerequisites for the course: BSc

## Course Modules: (30 hours)

- 1. Laboratory safety (4 h)
- 2. Fire safety (4 h)
- 3. Industrial safety (7 h)
- 4. Hygiene and occupational safety (5 h)
- 5. Basic First Aid (5 h)
- 6. Sewage treatment (5 h)

### Detailed syllabus:

https://www.unigoa.ac.in/uploads/confg\_docs/20220916.07071 5~SKILL\_BASED\_COURSE\_LAB\_SAFETY.pdf

### Course Outcome:

- 1. Students will be in a position to understand how to work safely while handling chemicals in laboratory and industries.
- 2. Students will be in a position to help with First aid in case of accidents.
- 3. Students will be in a position to handle waste management.

Contact details: Dean, SCS dean.scs@unigoa.ac.in

### SCHOOL OF CHEMICAL SCIENCES, GOA UNIVERSITY Time Table (Semester-IV) 2022-23 M.Sc. Part-II (Chemistry)

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
10:00-11:00 11:00-12:00 12:00-01:00 02:00-03:00	(Tutorial/Remedial) ICO-503 OCO-506 ACO-505 PCO-502	ICO-503 (VMSV) OCO-506 (VKM/SKS) ACO-505 (HKK) PCO-502 (PPM)			Library	Value Added Course
11:00-12:00	ICO-503 (VMSV) OCO-506 (VKM/SKS) ACO-505 (HKK) PCO-502 (PPM)	ICO-503 (VMSV) OCO-506 (VKM/SKS) ACO-505 (HKK) PCO-502 (PPM)				Value Added Course
10:00-11:00 11:00-12:00 12:00-01:00 02:00-03:00	ICO-501 (KUN/RNJ) OCO-505 (STB/KLD) ACO-502 (DGP/KTD) PCO-501 (APN)	ICO-502 (RKK) OCO-505 (STB/KLD) ACO-503 (REP/KTD) PCO-506 (VRC)	CGO-500	CGO-500	CGO-500	SBSI
02:00-03:00	ICO-502 (RKK) OCO-504 (BAS/RAK) ACO-503 (REP/KTD) PCO-506 (VRC)	ICO-501 (KUN/RNJ) OCO-505 (STB/KLD) ACO-502 (DGP/KTD) PCO-501 (DGN)				
03:00-04:00	ICO-501(KUN/RNJ) OCO-504 (BAS/RAK) ACO-502 (DGP/KTD) PCO-501 (DGN)	ICO-502 (RKK) OCO-504 (BAS/RAK) ACO-503 (REP/KTD) PCO-506 (VRC)			5	Mentoring
12:00-01:00 02:00-03:00	(Tutorial/Remedial) ICO-502 OCO-505 ACO-503 PCO-506	(Tutorial/Remedial) ICO-501 OCO-504 ACO-502 PCO-501	Library	Library	Student Seminar	

LUNCH BREAK: 01:00-02:00 pm

Classroom: LH-3/4/5/6. Dissertation: Part-II labs

Sr. No.	Subject code	Paper title	Credits	Teachers
1	ICO-501	Bioinorganic Chemistry	3	KUN, RNJ
2	ICO-502	Catalysis: The basic Chemical concepts	3	RKK
3	ICO-503	Chemistry of P-Block Elements	3	VMSV
4	OCO-504	Retrosynthesis in Organic Chemistry	3	BAS, RAK
5	OCO-505	Heterocyclic Chemistry	3	STB, KLD
6	OCO-506	Introduction to Polymer Chemistry-I: Basic Concepts	3	VKM, SKS
7	ACO-502	Calibrations and Validation in Analytical Chemistry	3	DGP, KTD
8	ACO-503	Advanced Mass Spectrometry	3	REP, KTD
9	ACO-505	Problems on Combined Spectroscopy	3	нкк
10	PCO-501	Solid State Chemistry I: Concepts and Applications	3	DGN, APN
11	PCO-502	Catalysis: Fundamentals and Applications	3	PPM
12	PCO-506	Nanoscience: Concepts and Applications	3	VRC
13	CGO-500	Dissertation	6	VMSV, SND, RKK, SRN, KUN, BAS, VKM, STB, RAK, KLD, DGP, REP, HKK, SAK, PSV, KTD, RNS, PPM, APN, DGN, VRC, NJ
14	CHCS-501	Laboratory safety, first aid and waste management (Value added course)	2	DGP, PSV, RAK, VRC, BAS, REP, STB, KBD, APK
15	Mentoring	NET/SET/GATE/Competitive exam/ Mentor-Mentee Interaction		-

Date: 30 | 11 | 2022

**Program Director** 

Vice Dean (Academic)

Dean, SCS

### **ANNEXURE-III**

Programme: M. Sc. Chemistry (Skill Based Course)

**Course Code:- CHCS-501** 

Title of the Course: Laboratory safety, first aid and waste management (A course on transferable life skills)

Number of Credits: 02 Total Hours: 30 Effective from AY: 2022-2023

Prerequisites for the	Should have studied B. Sc.	
Course:		
Course	1. Study of various concepts related to laboratory and industrial safety.	
Objective:	2. Study of various methods and techniques for First aid.	
	3. Study of various methodologies of waste management.	
Course	1. Students will be in a position to understand how to work safely while handling chemicals in laboratory and indu	stries.
Outcome:	2. Students will be in a position to help with First aid in case of accidents.	
	3. Students will be in a position to handle waste management.	
	Content	Hours
1. Laboratory s	$\cdot$	4
· ·	lities in laboratory	
- Purpos	e and responsibilities	
	aboratory safety practices	
1.2. Chemical I	Managements	
- Introdւ	uction to chemical inventory and material safety data sheet	
- Chemi	cal storage and chemical labelling	
- Transp	ortation of chemicals in laboratory	
- Special	chemical hazards	
1.3. Introduction	n to Personal protective equipments.	
- Eye pro	otection, face protection, hand protection, head protection, foot protection, protective clothing, respiratory	
	tion and hearing protection.	
1.4. Safe handli	ng of glasswares	
2. Fire Safety		4
2.1. Chemistry	of Fire	
- Fire Tetral	nedron	
- Combustic	on	

- Flame	
-Premixed and Diffusion Flame, Practical Examples of Premixed Flames and Diffusion Flames	
- Ignition	
- Self Heating and Spontaneous Combustion, Smoldering	
- Stages in a Fire	
- Heat Transfer	
- Fire Hazards of Materials	
- Sources of Information on Hazardous Materials	
2.2. Fire Extinguishment	
- Classifications of Fires	
- Extinguishing Agents	
-Water, Carbon Dioxide, Halogenated Agents / Clean Agents, Dry Chemicals, Foam Extinguishing	
Agents, Combustible Metal Extinguishing Agents, Kitchen Fires	
2.3. Introduction to Fire Extinguishers	
-Fire Extinguisher Use in The Workplace	
-Maintenance, Inspection, And Testing of portable fire extinguishers	
3. Industrial Safety.	7
3.1. Risk, Hazard, types of hazards	
-Introduction to engineering controls and administrative controls	
3.2. Safety in industry	
- Safe/Unsafe Condition, Safe/Unsafe Acts, Near Miss	
- Risk Assessment (Procedure and protocols with example)	
3.3. Hazardous Chemical Waste	
- Types of Waste, Waste minimization	
- Waste Management, segregation and disposal	
3.4. Demonstration	
- Mock fire drill	
- Mock evacuation drill	
- Safety audits	
4. Hygiene and Occupational safety	5
- Introduction to Occupational Safety and Health, occupational hygiene	
- Basics of Ergonomic; Ergonomic disorders and preventive measures for improved health and safety	
- Selecting appropriate ergonomic chair, manual material handling	

	tal exercises for lab personnel	
- Need for Hygi	ene and types of Hygiene (demonstration)	
5. Basic First A	id	5
5.1. Introducti	on to First Aid	
- Origin, aim	and scope of first aid, Overview of the human body	
5.2. First aid e	quipment	
- Contents of	the first aid box	
- Role and re	sponsibilities of a first aider	
- Assessing th	ne situation and acting safely, effectively and promptly in an emergency	
5.3. Emergency	care	
- Assessing th	ne Victim: primary survey, secondary survey, head-to-toe examination,	
monitoring	vital signs	
- use of eyew	ash and showers for chemical spillage	
- Cardiopulm	onary Resuscitation (CPR)	
- Airway Obs	tructions	
- Controlling	Bleeding	
- Managing ບ	nconscious casualty: checking and monitoring breathing and circulation, life-	
saving prior	ities for unconscious adults, unconscious child, unconscious infant.	
5.4. Protocols f	or Common injuries and their immediate care for different emergencies	
- Shock, Wou	ınds and soft tissue Injuries, Burns, Head and spinal Injuries, Chest, Abdominal and Pelvic	
Injuries, Bone,	Joint and Muscle Injuries, Extremity Injuries and Splinting, Poisoning, Bites and Stings	
Sudden illness,	Drowning, hyperventilation, asthma, Cold and heat emergencies, Electrical	
Incidences, cho	king in adults and infants.	
6. Sewage Tre	atment	5
6.1. Introduction	on to the waste treatments, Types of waste: Solid, Liquid and Gaseous	
- Environmer	ntal laws: The water (Pollution and control of pollution) Act, 1974	
6.2. General ch	aracteristics of waste: Liquid waste - Electrical conductivity, pH, COD, BOD, TS	
and TDS, to	tal suspended solids, total volatile solids, chlorides, sulphates, oil & grease.	
6.3. Waste Wat	er Treatment Technologies: A. Primary treatment methods B. Secondary	
treatment	methods and C. Tertiary treatment methods	
- Sludge disp	osal: Methods of sludge disposal. Sources and effects of sludge on environment.	
6.4. Visit to Sev	vage treatment plant.	
Pedagogy	Lectures & tutorials. Seminars / assignments / presentations / demonstrations / self-study or a combin	nation of some of
	these could also be used.	

### References /Readings:

- 1. C. C. Fevzi and I. Adnan, Laboratory safety handbook, 1<sup>st</sup> Edition, 2016, Sabanci University.
- 2. Laboratory safety manual, Environmental Health and Safety Department, University of Washington, December 2021 Edition. (www.ehs.washington.edu)
- 3. D. Philpott, Fundamentals of Fire Protection for the Safety Professional, 3<sup>rd</sup> Edition, 2022, Bernan Press.
- 4. Indian Standard- 2190:2010, Selection, Installation and Maintenance of First-Aid Fire Extinguishers Code of Practice (Fourth Revision) (http://tricone.co.in/Downloads/selection,installation\_and\_maintenance\_of\_first-Aid\_Fire\_Extinguishers1\_IS%201290.pdf)
- 5. K. R. Muller, Chemical waste handling and treatment, 1<sup>st</sup> Edition, 1986, Springer Verlag Berlin Heidelberg.
- 6. Prudent practices in the laboratory: handling and management of chemical hazards, the National Academic Press, 2<sup>nd</sup> Edition, 2011, National Academies Press.
- 7. K. Park, Park's text book of Preventive and Social Medicine, 19<sup>th</sup> Edition, 2007, Banarsidas Bhanot publishers, India
- 8. NIEHS Health and Safety Guide to Laboratory Ergonomics. (https://ehs.uky.edu/docs/pdf/ohs\_erg\_ergonomics\_guide\_0001.pdf)
- 9. M. B. Pamela, Ergonomics Foundational Principles Applications and Technologies, 1<sup>st</sup> Edition, 2021, Taylor & Francis publisher.
- 10. The authorized manual of St. John Ambulance, St. Andrew's Ambulance association and the British red cross society, First Aid manual, 9<sup>th</sup> Edition, 2011, Dorling Kindersley.
- 11. J. R. Krohmer, American college of emergency physicians First Aid manual, 5<sup>th</sup> Edition, Dorling Kindersley.
- 12. I. Clement, Text book on First Aid & Emergency Nursing, 1<sup>st</sup> Edition, 2012, JP brothers.
- 13. P. Jevon, Emergency care and First Aid for Nurses, A practical guide, 1<sup>st</sup> Edition, 2007, Churchill Living Stone.
- 14. M. N. Rao and A.K. Datta, Waste Water Treatment, 3<sup>rd</sup> Edition, 2017, Oxford & IBH Publishing Co. Pvt. Ltd.
- 15. M. J. Hammer, Sewage and waste treatment, 7<sup>th</sup> Edition, 2012, Prentice Hall India Learning Private Limited.

### Goa University School of Chemical Sciences

### Value added course (30 hours) 2022-23

### CHCS-501 Laboratory safety, First aid and waste management List of students

Seat No	Student Name	Specialization
21P049001	Andrade Amanda Severina	Analytical Chemistry
21P049002	Barve Shruti Prasanna	Analytical Chemistry
21P049005	Borkar Akshay Deepak	Analytical Chemistry
21P049008	Coutinho Jewella Britney	Analytical Chemistry
21P049015	Dias Kimberly Mary	Analytical Chemistry
21P049019	Fernandes Kate	Analytical Chemistry
21P049024	Gaonkar Samiksha Shamba	Analytical Chemistry
21P049032	Kholkar Tanuja Ashok	Analytical Chemistry
21P049034	M Shivani	Analytical Chemistry
21P049037	Mandrekar Navin Mohan	Analytical Chemistry
21P049039	Vandit Mardolkar	Analytical Chemistry
21P049046	Naik Deepraj Pandurang	Analytical Chemistry
21P049047	Naik Navanki Namdev	Analytical Chemistry
21P049057	Palyekar Tanay Sudhakar	Analytical Chemistry
21P049063	Patgar Shrushti Govind	Analytical Chemistry
21P049077	Coutinho Savia Justino	Analytical Chemistry
21P049081	Sayyad Oumaysaudda Hifzul Rehman	Analytical Chemistry
21P049083	Sharma Sheetal	Analytical Chemistry
21P049084	Shenvi Karapurkar Apurva Nitin	Analytical Chemistry
21P049092	Velip Deepti Krishna	Analytical Chemistry
21P049006	Braganca Elvy Rena	Inorganic Chemistry
21P049014	Dias Edsel Xavier	Inorganic Chemistry
21P049018	Fernandes Jenny	Inorganic Chemistry
21P049027	Gomes Vini	Inorganic Chemistry
21P049028	Kamat Neha Datta	Inorganic Chemistry
21P049029	Kamat Saharsha Sanjay	Inorganic Chemistry
21P049036	Mainkar Krutika Mahadev	Inorganic Chemistry
21P049042	Modak Priyanka Sudin	Inorganic Chemistry
21P049050	Naik Shama R	Inorganic Chemistry
21P049053	Naik Tejal Tulsidas	Inorganic Chemistry
21P049055	Naik Vishaka Damodar	Inorganic Chemistry
21P049058	Parab Aditi Rajendra	Inorganic Chemistry
21P049062	Parwar Shankar Ramnath	Inorganic Chemistry
21P049066	Pereira Aleta	Inorganic Chemistry
21P049068	Gaonkar Prachita Chandro	Inorganic Chemistry
21P049069	Revodkar Jeevita Jeevan	Inorganic Chemistry

21P049072	Salgaonkar Priyanka Prakash	Inorganic Chemistry
	Sawant Sanisha Surendra	Inorganic Chemistry
21P049082		Inorganic Chemistry
	Tari Jatin Dnyaneshwar	Inorganic Chemistry
	Gaonkar Upma Ulhas	Inorganic Chemistry
	Yallurkar Peetambar	Inorganic Chemistry
	Bhobe Shreya Ganesh	Organic Chemistry
	Bhonsle Akshata	Organic Chemistry
	Colaco Ria Infancia Velerie	Organic Chemistry
	Crasto Navita Henriqueta	Organic Chemistry
	Dessai Gajain Vishwas	Organic Chemistry
	Faterpekar Rohan Ramesh	Organic Chemistry
21P049023	*	Organic Chemistry
	Gawas Rutika Ramnath	Organic Chemistry
	Kanti Hanumant Mayanikar	Organic Chemistry
21P049030 21P049031		Organic Chemistry
	Kinalekar Purva Mahadev	Organic Chemistry
	Gaonkar Manjusha Mahadev	Organic Chemistry  Organic Chemistry
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	Mayekar Shanti Murari	Organic Chemistry
	Naik Aakansha Rajesh	Organic Chemistry
	Naik Shubham Santosh	Organic Chemistry
	Naik Vaishnavi Pramod	Organic Chemistry
	Parab Sneha Pradeep	Organic Chemistry
	Rivonker Shubham Chandrashekher	Organic Chemistry
21P049071	, ,	Organic Chemistry
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	Shenvi Sangaonkar Suyash Chandrashekhar	Organic Chemistry
21P049087	· ·	Organic Chemistry
	Zore Surekha Devidas	Organic Chemistry
	Da Cruz Fernandes Shanaia Tabitha	Physical Chemistry
	Desur Bibi Sakina Ibrahim	Physical Chemistry
21P049022		Physical Chemistry
21P049025		Physical Chemistry
	Mainikar Mohit Dilip	Physical Chemistry
21P049044		Physical Chemistry
21P049045		Physical Chemistry
	Naik Rakshali Ramdas	Physical Chemistry
21P049049	Naik Saloni Sandeep	Physical Chemistry
21P049052	Naik Tanay Gopal	Physical Chemistry
21P049059	Parab Pankaj Vishnu	Physical Chemistry
21P049067	Hebram Pooja	Physical Chemistry
21P049074	Samant Shivani Vallabh	Physical Chemistry

21P049076	Desai Sarvesh Sanjiv	Physical Chemistry
21P049090	Vaigankar Chandani Hanumant	Physical Chemistry
21P049095	Viegas Bernice Minoshka	Physical Chemistry
21P046001	Angadi Aishwarya Rajendra	Biochemistry
21P046002	Chigadinkopkar Vidhya Ramdas	Biochemistry
21P046003	Gaonkar Brijesh Raju	Biochemistry
21P046005	Ghadi Sumedha Vinayak	Biochemistry
21P046007	Haldankar Siddhi Santosh	Biochemistry
21P046008	Kanyal Roshan Begum	Biochemistry
21P046010	Shrivastav Khushi Sanjay	Biochemistry
21P046012	Manerkar Gauravi Praveen	Biochemistry
21P046013	Maurya Neha	Biochemistry
21P046014	Menon Sudhin Sukumaran	Biochemistry
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Taleigao Plateau, Goa - 403 206
Tel: +91-8669609048
Email: registrar@unigoa.ac.in
Website: www.unigoa.ac.in

(Accredited by NAAC)

### SCHOOL OF CHEMICAL SCIENCES

### CERTIFICATE

This is to certify that Mr./Ms. <u>Parwar Shankar Ramnath</u>, Roll No. <u>21P049062</u>, student of M.Sc. Part-II <u>Inorganic Chemistry</u>, has attended a Skill Based Course on transferable life skills, titled "Laboratory safety, first aid and waste management" (CHCS-501) conducted by the School of Chemical Sciences, Goa University, for 30 hours (2 credits) from January 2023 to April 2023 which is over and above the regular postgraduate programme credits.

Date: 21/06/2023

Seal:

(Prof. Vidhyadatta M. S. Verenkar)

Dean
School of Chemical Sciences

Goa University







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Email: registrar@unigoa.ac.in
Website: www.unigoa.ac.in

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### SCHOOL OF CHEMICAL SCIENCES

### CERTIFICATE

This is to certify that Mr./Ms. <u>Rivonker Shubham Chandrashekher</u>, Roll No. <u>21P049070</u>, student of M.Sc. Part-II <u>Organic Chemistry</u>, has attended a Skill Based Course on transferable life skills, titled "Laboratory safety, first aid and waste management" (CHCS-501) conducted by the School of Chemical Sciences, Goa University, for 30 hours (2 credits) from January 2023 to April 2023 which is over and above the regular postgraduate programme credits.

Date: 21/06/2023

Seal:

TALEIGAO PLATEAU SON GOA GOA

(Prof. Vidhyadatta M. S. Verenkar)
Dean
School of Chemical Sciences
Goa University





Taleigao Plateau, Goa - 403 206
Tel: +91-8669609048
Email: registrar@unigoa.ac.in
Website: www.unigoa.ac.in

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### SCHOOL OF CHEMICAL SCIENCES

### CERTIFICATE

This is to certify that Mr./Ms. <u>Viegas Bernice Minoshka</u>, Roll No. <u>21P049095</u>, student of M.Sc. Part-II <u>Physical Chemistry</u>, has attended a Skill Based Course on transferable life skills, titled "Laboratory safety, first aid and waste management" (CHCS-501) conducted by the School of Chemical Sciences, Goa University, for 30 hours (2 credits) from January 2023 to April 2023 which is over and above the regular postgraduate programme credits.

Date: 21/06/2023

Seal:

(Prof. Vidhyadatta M. S. Verenkar) Dean

School of Chemical Sciences Goa University







Taleigao Plateau, Goa - 403 206 +91-8669609048 Email: registrar@unigoa.ac.in Website: www.unigoa.ac.in

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### SCHOOL OF CHEMICAL SCIENCES

### CERTIFICATE

This is to certify that Mr./Ms. Ghadi Sumedha Vinayak, Roll No. 21P046005, student of M.Sc. Part-II Biochemistry, has attended a Skill Based Course on transferable life skills, titled "Laboratory safety, first aid and waste management" (CHCS-501) conducted by the School of Chemical Sciences, Goa University, for 30 hours (2 credits) from January 2023 to April 2023 which is over and above the regular postgraduate programme credits.

Date: 21/06/2023

Seal:

(Prof. Vidhyadatta M. S. Verenkar) Dean School of Chemical Sciences

Goa University





Taleigao Plateau, Goa - 403 206
Tel: +91-8669609048
Email: registrar@unigoa.ac.in
Website: www.unigoa.ac.in

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### SCHOOL OF CHEMICAL SCIENCES

### **CERTIFICATE**

This is to certify that Mr./Ms. <u>Naik Deepraj Pandurang</u>, Roll No. <u>21P049046</u>, student of M.Sc. Part-II <u>Analytical Chemistry</u>, has attended a Skill Based Course on transferable life skills, titled "Laboratory safety, first aid and waste management" (CHCS-501) conducted by the School of Chemical Sciences, Goa University, for 30 hours (2 credits) from January 2023 to April 2023 which is over and above the regular postgraduate programme credits.

Date: 21/06/2023

Seal:

(Prof. Vidhyadatta M. S. Verenkar)
Dean

School of Chemical Sciences Goa University

