Parvatibai Chowgule College of Arts and Science
Autonomous
Accredited by NAAC with Grade A' (CGPA Score 3.41 on a 4 Point Scale 3rd cycle)
Best affiliated College-Goa University Silver Jubilee Year Award

MINUTES OF THE NINTH BOARD OF STUDIES IN ZOOLOGY HELD ON 29th JANUARY, 2022 AT 10:00 am
(VIRTUAL MODE VIA GOOGLE MEET: https://meet.google.com/mrw-gust-juo)

Vide Parvatibai Chowgule College of Arts and Science (Autonomous) notice (F.133C/1383 emailed on 24-01-2022) a virtual meeting of the BoS was convened on 29th January, 2022 at 10:00 am via an online meet. Since the members who attended represented the quorum, the BoS began its proceedings.

In the absence of the Head of the Department, Dr. Nandini Vaz Fernandes (on Child Care Leave), Ms. Mithali Halarnkar (Incharge of the Zoology Department) was the stand-in chairperson for the ninth BoS meeting.

MEMBERS PRESENT (Attended in virtual mode)

1. Ms. Mithali Halarnkar	Chairperson
2. Dr. Shyama Soorambail Keshava	Vice Chancellor Nominee
3. Dr. I. K Pai	Academic Council Nominee
4. Dr. Philip Mascarenhas	Representative from Industry
5. Ms. Karen Braganza	Alumnus
6. Ms. Filomena Pereira	Member secretary
7. Ms. Shalma Mascarenhas	Member
8. Ms. Gautami Manakikar	Member
9. Ms. Prasanna Naik Gaonkar	Member

MEMBER ABSENT (with intimation)

1. Dr. Sameer Terdarlkar — Academic Council Nominee

PROCEEDINGS:

At the onset, the chairperson welcomed and introduced the members of Board of Studies (BoS) for the ninth BoS meeting. Member secretary designate read out the minutes of eighth BoS meeting that was held on 18th February, 2021. The minutes were approved by the members of the Board. Chairperson then placed the agenda of the meeting for deliberations.

AGENDA:

1. To approve the realigned course structure in Zoology.
2. To approve elective course and skill enhancement course.
3. Any other business (A.O.B)

PART A: RESOLUTIONS

A) Agenda 1: APPROVAL OF REVISED COURSE STRUCTURE

The Chairperson, presented a draft of a realigned course structure. It was proposed to shift the presently offered "ZOO-VI.E-16 - Bio Entrepreneurship" as an elective course from semester VI to semester IV to be offered as a new skill enhancement course (ZOO-IV.SE-2). A new elective course "Reproductive Biology and Technologies" was proposed in lieu of "Bio Entrepreneurship" course in semester VI.

SEMESTER	CORE COURSES	ELECTIVE COURSES				SKILL ENHANCEMENT COURSE
IV	ZOO-IV.C-6 Biochemistry and Metabolic Regulation	ZOO-IV.E-5 Animal cell culture and Applications	ZOO-IV.E-6 Aquaculture and Fisheries	ZOO-IV.E-7 Immunology	ZOO-IV.E-8 Evolutionary Biology	ZOO-IV.SE-2 Bio Entrepreneurship
VI	ZOO-VI.C-8 Wildlife Biology	ZOO-VI.E-13 Health and Nutrition	ZOO-VI.E-14 Ecology and Ethology	ZOO-IV.E-15 Laboratory Techniques in Pathology	ZOO-IV.E-16 Reproductive Biology and Technologies	

Resolution: After due deliberations and discussion the realignment of courses was approved by the BOS members.

B) Agenda 2: APPROVAL OF AN ELECTIVE COURSE AND SKILL ENHANCEMENT COURSE

Chairperson presented the theory and practical component syllabi of the newly proposed elective course for semester VI "ZOO-VI.E-16 - Reproductive Biology and Technologies" to the BoS members. The syllabus for Skill Enhancement Course "Bio Entrepreneurship" to be offered at semester IV was also presented to the BOS members.

Resolution: After due deliberations and discussions the syllabus for the elective course was approved by the BoS members. (Syllabus attached)

The members suggested a change in the name of the course title from "Reproductive Biology and Technologies" to "Reproductive Biology and Assisted Reproductive Methods" (As the matter remained unresolved, it was decided to consider it for discussion in the next BoS meeting).

C) Agenda 3: Any other business (A.O.B)

The members suggested addition of following reference books to the respective courses.

a) Strickberger, M. (2000). *Evolution*, Third Edition, Jones and Barlett, Sudbury. (ZOO-IV.E-8 – Evolutionary Biology)
b) Krebs, J. E. (2014). *Gene IX*, Jones and Bartlett Learning, Burlington. (ZOO-V.E-9 – Molecular Genetics and Forensic Science)
c) Nair, M. R. G. K. (2007). *Insects and Mites of Crops of India*, Second Edition, Indian Council of Agricultural Research. (ZOO-VI.E-11 – Basic and Applied Entomology)

Resolution: The addition of reference books to the respective course syllabi was approved by the board members.

The members recommended inclusion of the following topics in the respective courses.

a) Introduction to epigenetics and its regulation on gene expression (ZOO-V.E-9)
b) Introduction to omics (ZOO-V.E-9)
c) Climate change and its mitigations (ZOO-V.E-11)
d) Invertebrate Endocrinology (ZOO-III.E-1)
e) Communicable diseases in Entomology course (ZOO-VI.E-11)

Resolution: As discussion on the subject could not be held, it was decided to consider the same in the next meeting of the BoS.

The members recommended formulation of a new skill enhancement courses for the students on

a) Permaculture

b) Bioinformatics

Resolution: As discussion on the subject could not be held, it was decided to consider the same in the next meeting of the BoS.

The members suggested a change in the course outcome (CO4) of "ZOO-VI.E-13 - Health and Nutrition" from "Prepare diet plans for different age group individuals" to "Preparation of need based diet plans for individuals".

Resolution: To be taken up for discussion in the next BoS meeting.

PART B:

RESOLUTIONS/RECOMMENDATIONS OF BOS THAT REQUIRE CONSIDERATION/APPROVAL OF ACADEMIC COUNCIL (REFER ANNEXURE A)

1) Proposed shift of an elective course "ZOO-VI.E-16 - Bio Entrepreneurship" from semester VI to semester IV as a new skill enhancement course "ZOO-IV.SE-2 – Bio Entrepreneurship".
2) Approval of syllabus of newly proposed elective course "ZOO-VI.E-16 - Reproductive Biology and technologies" for semester VI in place of Bio Entrepreneurship.
3) Approval for addition of reference books to the respective course syllabi.

The chairperson thanked the members of the Board of studies in Zoology for their valuable contributions, suggestions and participation.

The foregoing minutes of the meeting was circulated by the stand-in chairperson, Board of studies in Zoology after the conclusion of the BoS meeting.

The following members of the Board of Studies were present for the meeting via virtual mode.

1. Ms. Mithali Halarnkar	Chairperson
2. Dr. Shyama Soorambail Keshava	Vice Chancellor Nominee
3. Dr. I. K Pai	Academic Council Nominee
4. Dr. Philip Mascarenhas	Representative from Industry
5. Ms. Karen Braganza	Alumnus
6. Ms. Filomena Pereira	Member secretary
7. Ms. Shalma Mascarenhas	Member
8. Ms. Gautami Manakikar	Member
9. Ms. Prasanna Naik Gaonkar	Member

Member absent (with intimation)

2. Dr. Sameer Terdarlkar — Academic Council Nominee

Ms. Mithali Halarnkar
(Chairperson BoS)

Ms. Filomena Pereira
(Member secretary)

Date: 22-02-2022

PART C:

The remarks of the dean of the faculty

a) The minutes are in order
b) The minutes may be placed before the academic council with remark, if any.
c) Important points of the minutes which need clear decision of the academic council to be recorded.

Signature of the Dean: _____

Date: 22/02/2022

REVISED COURSE STRUCTURE: PROGRAMME BSC ZOOLOGY

SEMESTER	CORE COURSES		ELECTIVE COURSES			
I	**ZOO-I.C-1** Animal Diversity :Non Chordates	**ZOO-I.C-2** Cell and Molecular Biology	--------	--------	--------	--------
II	**ZOO-II.C-3** Diversity and Biological Systems of Chordates	**ZOO-II.C-4** Fundamentals of Animal and Human Genetics	--------	--------	--------	--------
III	**ZOO-III.C-5** Human Physiolog y		**ZOO-III.E-1** Vertebrate Endocrinology	**ZOO-III.E-2** Basic microbiology and Fundamentals of Animal Biotechnology	**ZOO-III.E-3** Environmental Toxicology	**ZOO-III.E-4** Parasitology ** **ZOO-III.SE-1** Waste Management Techniques
IV	**ZOO-IV.C-6** Biochemistry and Metabolic Regulatio n		**ZOO-IV.E-5** Animal cell culture and Applications	**ZOO-IV.E-6** Aquaculture and Fisheries	**ZOO-IV.E-7** Immunology	**ZOO-IV.E-8** Evolutionary Biology ** **ZOO-IV.SE-2** Bio Entrepreneurship
V	**ZOO-V.C-7** Developmental Biology		**ZOO-V.E-9** Molecular Genetics and Forensic Science	**ZOO-V.E-10** Economic Zoology	**ZOO-VI.E-11** Basic and Applied Entomology	**ZOO-V.E-12** Fish Preservation and Processing
VI	**ZOO-VI.C-8** Wildlife Biology		**ZOO-VI.E-13** Health and Nutrition ***ZOO-VI.GE-1** Health and Nutrition	**ZOO-V.E-14** Ecology and Ethology	**ZOO-VI.E-15** Laboratory Techniques in Pathology	**ZOO-VI.E-16** Reproductive Biology and Technologies
***Generic Elective(GE) / ** Skill Enhancement (SE) courses**						

PARVATIBAI CHOWGULE COLLEGE OF ARTS AND SCIENCE (Autonomous)

COURSE CURRICULUM

OF

PROGRAMME

BSC ZOOLOGY

COURSE STRUCTURE
PROGRAMME BSC ZOOLOGY

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I	**ZOO-I.C-1** Animal Diversity : Non Chordates	**ZOO-I.C-2** Cell and Molecular Biology	--------	--------	--------	--------
II	**ZOO-II.C-3** Diversity and Biological Systems of Chordates	**ZOO-II.C-4** Fundamentals of Animal and Human Genetics	--------	--------	--------	--------
III	**ZOO-III.C-5** Human Physiology		**ZOO-III.E-1** Vertebrate Endocrinology	**ZOO-III.E-2** Basic microbiology and Fundamentals of Animal Biotechnology	**ZOO-III.E-3** Environmental Toxicology	**ZOO-III.E-4** Parasitology ** **ZOO-III.SE-1** Waste Management Techniques
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***Generic Elective(GE) / ** Skill Enhancement (SE) courses**

SEMESTER IV:

SKILL ENHANCEMENT COURSE: BIOENTREPRENEURSHIP	
COURSE CODE	**SKILL ENHANCEMENT COURSE(SEC): ZOO-SE-2**
MARKS	100 [25 -Theory; 75- Practice Based]
CREDITS	04
CONTACT HOURS	Theory: 15 HOURS [01 Lectures Per Week] Practice based: 45 HOURS (03 hrs/week) 15 hrs of intervention by teacher.
COURSE OBJECTIVES	• To help students recognize the opportunities of enterprises in the field of life sciences. • To encourage students to think independently and explore new vistas • To familiarize them with the basic skills required for a start-up
COURSE OUTCOME:	Upon successful completion of the course, students will be able to: CO1: understand concept of business Proposals CO2: familiar with the methodologies and regulations required to start an enterprise CO3: Identify opportunities available in life science for start- ups. CO4: Generate Ideas and initiate a Business Plan.

ZOO-IV-SE-2: BIOENTREPRENEURSHIP		
MODULE	**TOPICS**	**CONTACT HOURS**
MODULE 1: Entrepreneurship Development	Unit 1: Introduction to entrepreneurship: entrepreneurial competencies and goal setting, bio entrepreneurship, building abio-enterprise: balance management, capital, technology. Unit 2: Introduction to innovation: identifying business opportunities Unit 3:Raising funds: public and private	05
MODULE 2: Business plan, Guidelines And regulations For entrepreneurship in life sciences	Unit 4: Business model canvas Unit 5: Guidelines and regulations: Certification and licensing, acts, regulations and guidelines, marketing and export process, accessing university technology, research and development agencies in India Unit 6: Role of micro, medium and small scale industry sector Unit 7: Innovations in research: writing project proposals to various funding bodies such as MHRD,UGC, DST, DBT, etc.	05
MODULE 3: **Start-up, quality, safety and procedural compliance s in a bio enterprise**	Unit 8: Intellectual Property Rights and trademark of biological resources Unit 9: Quality, safety and procedural compliances Bio safety and its implementations, Quality control in entrepreneurship, WHO Guidelines for setting up of a contract research organization, Starting a research laboratory in India- guidelines and permits required.	05
MODULE 4: **Practice based component**	Practice based component: 1. Lateral thinking and testing entrepreneurial 2. Activities: Brainstorming in Group/market investigation to initiate business ideas for biologists. Preparing Business proposal sketch. 3. Financial Planning. 4. Identifying investors. 5. Developing marketing strategies. 6. Interactions with successful entrepreneur, Banker/ Angel Investors/ Visit to a bio- startup. 7. Formulating and presenting Business model 8. Preparation of final Business execution plan. 9. Submission of the learning process and outcome as Portfolio.	45

REFERENCES:

1. Garg, M.C. (2015) Entrepreneurial development. Guset User.
2. Kolchinsky, P. (2004) The entrepreneurs guide to a biotech startup. 4th edition. www.evelexa.com
3. Simon, S. 2009. Start with why: How great leaders inspire everyone to take action. Penguin Group (USA) Inc .
4. Welch, J. and Byrne, J.A. 2003. Straight from the gut. Business plus publishers.

SEMESTER VI

ELECTIVE COURSE : ZOO-VI-E-16: REPRODUCTIVE BIOLOGY AND TECHNOLOGIES	
COURSE CODE:	ZOO-VI-E-16
MARKS	100 [75 –Theory ; 25- Practicals]
CREDITS	04 [03 –Theory; 01- Practical]
CONTACT HOURS	THEORY : 45 HOURS (03 LEC/WEEK) PRACTICALS: 30 HOURS (01 PRACTICAL /WEEK)
COURSE OBJECTIVE:	• To provide the student with a clear understanding of the anatomy and physiology of human reproduction and the infertilities associated. • Clinical case discussions designed to emphasize the role of technology of reproduction, prenatal diagnosis, in-vitro fertilization and ethics and laws pertaining to reproductive technology.
COURSE OUTCOME:	Upon successful completion of the course, students will be able to: CO1: Correlate the infertility causes to the functioning of human reproductive tract. CO2: Propose appropriate options of reproductive technologies. CO3: Know about various prenatal diagnostic options for overcoming infertility or ensuring health pregnancy outcome. CO4: Understand the laws pertaining to reproductive Technology.

ZOO-VI.E-16: REPRODUCTIVE BIOLOGY AND TECHNOLOGIES		
MODULE	**TOPIC**	**CONTACT HOURS**
MODULE 1: Introduction to Reproductive biology	1.1 Reproductive biology Male reproductive system: Anatomy and overview of physiology. 1.2 Female reproductive system: Anatomy and overview of Physiology 1.3 Infertility in males and females: Types, Causes (including endocrine basis). 1.4 Discussion / analysis of Case studies, Epidemiology of Infertility (global trends).	15
MODULE 2: Reproductive Technologies and Surrogacy	2.1 Reproductive technologies: infertility and subfertility, assisted reproductive technologies (IUI, surrogate motherhood, IVF, GZIT, ZIFT), Embryonic glue. 2.2 Cutting-Edge Technologies in Reproductive Biology: Embryo screening and diagnosis, INVOcell, Time Lapse Embryoscope, DNA Fragmentation Index (DFI), Endometrial Receptivity Array (ERA), In-vitro maturation (IVM). 2.3 Surrogacy Definition, concepts and types of surrogacy, process and ethics, Commercialization of surrogacy.	15
MODULE 3: Technologies for ensuring health pregnancy outcome and Laws governing ART	3.1 Technologies for ensuring health pregnancy outcome Prenatal Diagnosis and Preimplantation genetic diagnosis: Definition: Various procedures amniocentesis, Chorionic villus sampling, Ultrasonography and Fetoscopy, PIGD. 3.2 Laws governing ART, Laws governing Reproductive technologies, Surrogacy bills 3.3 Gender equality/inequality: PNDT act, gender equality/inequality, component of laws governing ART in India.	15

PRACTICAL COMPONENT OF ZOO-VI.E-16: REPRODUCTIVE BIOLOGY AND TECHNOLOGIES (DURATION -02 HRS/WEEK)		
Sr.No.	**Practical**	No.of Practicals
1.	Histology of male and female reproductive system	02
2	Diagnosis of pregnancy by ELISA test	02
3	Nigrosin-Eosin sperm vitality test	02
4	Contraception and birth control methods	03
5	Visit/interactions with an infertility clinic	03

REFERENCES:

1 Jones R and Lopez KH. (2013). Human Reproductive biology, 4th Edition, Academic Press. ISBN: 9780123821850 99(E book available).
2 Jones R and Lopez KH. (2013). Human Reproductive biology, 3rd Edition, Elsevier Science. (E book available).
3 Bittar E. (1998). Reproductive Endocrinology and Biology, Vol 12. Elsevier Science.
4 Gardner DK. (2011). Human Assisted Reproductive Technology. Cambridge University Press.
5 Rao KA, Howard C and Fischer R. (2016). Principles & Practices of Assisted Rreproductive Technology. Jaypee digital publishers.

ANNEXURE A

(Summary of changes incorporated in the syllabus)

DEPARTMENT OF ZOOLOGY

Semester	Course Title	Existing	Change proposed	Reason for change
Semester IV		ZOO-III.SE-1 – Waste management techniques	Shift of the elective course "ZOO-VI.E-16 - Bio Entrepreneurship" from semester VI to semester IV as a new skill enhancement course.	To avoid repetition of skill enhancement course for the Zoology department students.
Semester VI		ZOO-VI.E-16 - Bio Entrepreneurship	New elective course " ZOO-VI.E.16 - Reproductive Biology and Assisted Reproductive Methods"	Need of a new elective course.
Semester IV and V	Semester IV: Evolutionary Biology Semester V: Molecular Genetics and Forensic Sciences Semester V: Basic and Applied Entomolgy		Addition of Reference books	Latest versions of the books and additional information.

1. Part B of the minutes of BoS meeting
2. Revised Course structure
3. Revised syllabus
4. Annexure A, which is the summary of the changes incorporated in the syllabus. s