UNIVERSITY OF MUMBAI
No. UG/241 of 2016-17

CIRCULAR:-

The Principals of the affiliated Colleges in Arts, Science and Commerce and the Heads of recognized Institutions concerned are hereby informed that the recommendation made by UGC Innovative Programme held on 4th July, 2016 has been accepted by the Academic Council at its meeting held on 14th July, 2016 **vide** item No. 4.93 and subsequently approved by the Management Council at its meeting held on 18th November, 2016 **vide** item No.29 and that in accordance therewith, in exercise of the powers conferred upon the Management Council under Section 54 (1) and 55 (1) of the Maharashtra Universities Act, 1994 and the Ordinances 6348 and 6349 and Regulations 9070, 9071 and 9072 and the syllabus as per the (CBCS) for the Certificate Course in Bee Keeping and Honey Processing has been introduced, which is available on the University's web site (www.mu.ac.in) and that the same has been brought into force with effect from the academic year 2016-17.

24/1/17

MUMBAI – 400 032
January, 2017

(Dr.M.A.Khan)
REGISTRAR

To,

The Principals of the affiliated Colleges in Arts , Science and Commerce and the Heads of Recognized Institutions concerned.

A.C/4.93/14.07.2016
M.C/29/18.11.2016

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No. UG/ -A of 2016-17 MUMBAI-400 032 January, 2017

Copy forwarded with Compliments for information to:-

1) The Co-Ordinator, faculty of Arts, Science and Commerce.
2) The Professor-cum-Director, Institute of Distance & Open Learning (IDOL)
3) The Director, Board of College and University Development,
4) The Co-Ordinator, University Computerization Centre,
5) The Controller of Examinations.

24/1/17

(Dr.M.A.Khan)
REGISTRAR

PTO...

AC 14-07-2016
Item No. 4.93

UNIVERSITY OF MUMBAI

Syllabus for Approval

Sr. No.	Heading	Particulars
1	**Title of the Course**	**CERTIFICATE COURSE IN BEE KEEPING AND HONEY PROCESSING**
2	**Eligibility for Admission**	Candidate who passed 10+2 examination with at least 45% marks in aggregate in Arts / Science / Commerce.
3	**Passing Marks**	The candidate must obtain 35 % of the total marks in theory and practical separately to pass the course.
4	**Ordinances / Regulations (if any)**	UGC Circular F14-4/2006 (CPP-II).
5	**No. of Years / Semesters**	**One Year (Two Terms)**
6	**Level**	**P.G. / U.G. / Diploma / Certificate** (Strike out which is not applicable)
7	**Pattern**	**Yearly / Semester** (Strike out which is not applicable)
8	**Status**	**New / Revised** (Strike out which is not applicable)
9	**To be implemented from the Academic Year**	**From Academic Year _____**

Date: Signature:

Name of BOS Chairperson / Dean: _____

UNIVERSITY OF MUMBAI

New Education Society's

ARTS, COMMERCE AND SCIENCE COLLEGE, LANJA.

RATNAGIRI.

UGC Funded Carrier Oriented Courses

Syllabus of

Certificate Course in

BEEKEEPING

AND

HONEY PROCESSING

Course Code: **UGCCOC BKT 02 – For Theory and**
UGCCOC BKP 02 – For Practical

CONTENT

PREAMBLE

Globalization of education and economy has led the University Grants Commission (UGC) to reorient and reshape its policies and programs to make the current Indian Higher Education System more relevant and career-oriented with focus on quality and excellence. It is envisaged that professionally qualified graduates with a sound knowledge of their core disciplines and expertise in a concerned skill will have more openings in service, industry and self-employment sectors. Demand and scope for such professionally trained graduates are visible in the applied fields of almost all basic/core disciplines and faculties in the current changing global scenario and is likely to increase in the future.

The present Career Oriented Course (COC) in **'Beekeeping and Honey Processing'** was introduced for F.Y. Undergraduate students of Science, Commerce and a Arts faculty the academic year 2015- 16 with a view to enhance essential for employability. This is the first time we are introducing this syllabus to the University of Mumbai. This syllabus, emphasis on development of entrepreneurial potential and skills amongst the students. From the academic year 2010- 2011, the University has introduced Credit Based Semester and Grading System with continuous evaluation involving Internal and External Assessment. This syllabus is modularized offering opportunity to learners to study techniques in Ornamental fish farming theoretically, practically and experimentally by directly working with established and successful entrepreneurs in this field.

OBJECTIVES OF THE COURSE:

1) To inculcate importance of Bee keeping and honey processing in relation with entrepreneurship development.
2) To give students knowledge about various techniques of Bee keeping and honey processing and its marketing to make them self sustainable after graduation.
3) To teach techniques of construction of Bee Hives and its maintenance.
4) To teach students about Honey production and health related problems with Honey bees.

ORDINANCE FOR CERTIFICATE COURSE IN BEEKEEPING AND HONEY PROCESSING. FUNDED BY UNIVERSITY GRANT COMMISSION, NEW DELHI

The certificate course in Beekeeping and Honey processing is a Career Oriented Course (COC) of UGC 2003-04 introduced at Under Graduate Level in B.A./ B.Sc./B.Com. and will be covered under following ordinances.

1. **Number of Students per batch are 40.**
2. The admission/examination shall be opened to any candidate who passed 10+2 examination with at least 45% marks in aggregate in science/commerce.
3. The candidate after passing examination will be awarded a separate certificate/diploma/advanced diploma in **Beekeeping and Honey Processing** in addition to his/her regular degree/detailed marks card of B.A.,B.Com. and B.Sc.
4. The supplementary examination shall be held in September or as fixed by the academic council. This examination shall be open to candidates who have been declared reappear in certificate course/diploma/advanced diploma course.
5. The candidate who doesn't pass in the supplementary examination will be given another chance to appear in above said course along with forthcoming annual examination.
6. A candidate who passed the course in the supplementary examination or in the third chance in annual examination can appear alongside in the next subsequent examination of above said course.
7. The candidate, who is unable to pass the course in three given chances, will not be allowed to continue the above said course.
8. Every candidate will be required to attend minimum of 75 % lectures/periods delivered to that class.
9. The candidate must obtain 35 % of the total marks in theory and practical separately to pass the course.
10. The candidate must have obtained in house examination at least 25% marks in the subject.
11. Candidates will be offered English/Marathi as the medium of instructions/examination.

FEE STRUCTURE:

Name of the Course	Tuition fee	Laboratory Fee	Library Fee	Total
Certificate Course in Bee Keeping and Honey Processing	800.00	400.00	300.00	1500.00

Amount in ₹

SYLLABUS OF THE COURSE

TITLE OF THE COURSE: BEE KEEPING AND HONEY PROCESSING.

SPONSORED BY UNIVERSITY GRANT COMMISSION, NEW DELHI

Course UGCCOC-BKT02	Unit	Topic	Credit	L/Unit
Term-I	I	Introduction to Apiculture - scope, importance	04	15
	II	Honey Bee morphology, Anatomy and Life cycle.		
	III	Honeybee health		
	IV	Honey - its properties and application in various fields		
Term -II	I	Bee keeping: Tools and Equipment.	04	15
	II	Honeybee Plants and Floral Calendar.		
	III	Honey Processing and Bee Hive Products		
	IV	Economics of bee keeping		
Practical based on Term – I &II			04	
Total				12

CERTIFICATE COURSE IN BEEKEEPING AND HONEY PROCESSING

Theory Syllabus of One Year Certificate Course

Program of the Course:

1. Course will be of 20 Credits, each credit will have 15 hours (45min.)
2. Out of 20 credits 8 credits will be assigned to field work/project/training
3. The candidate required to attend 75% lectures/periods.
4. The candidate must obtained 35% of the total marks in theory and practical/project work separate to pass the course.
5. Candidate will be offered English/Marathi as a medium of instructions/examination.
6. All 12^{th} examination passed and first year appearing under graduate students are eligible for this course.

Term-I (UNIT-I to UNIT-IV) & Term-II (UNIT-I to UNIT-IV)

Term - I

UNIT – I Introduction to Apiculture - scope, importance (15 L)

- History of bee keeping: Definition, Bee keeping in worldwide, In India. Traditional bee keeping, Modern beekeeping, Urban or backyard beekeeping.
- Apiculture development in India - institutions involved. Role of Central Honey Bee Research & Training Institute.

UNIT – II Honey Bee morphology, Anatomy and Life cycle (15 L)

- Basic concepts of morphology of Honey bees - indigenous, exotic
- Honey bee species and identification. Origin, systematic and distribution of honey bees. Types of honey bees, Species of honey bees. Bee identification.
- Social organization in honey bees: Colony life and social organization – Queen, drone, worker. Annual biological cycle of the bee colony.

UNIT – III Honeybee Enemies and Diseases (15 L)

- Bee enemies and diseases: An introduction, Bee enemies – Wax Moth, Ants, Wasps, Microorganisms, Pests. Diagnosis and Identification.
- Mites attacking honey bees: Varroa mites, Mite Biology, Controlling Varroa Mites, Mechanical control, Mite-tolerant stocks, Biopesticides, Chemical (synthetic pesticide) treatments.
- Bacterial, viral, fungal & protozoan diseases: Bacterial disease - American Foulbrood, European Foulbrood, Viral disease - Deformed Wing Virus, Sacbrood Virus, Black Queen Cell Virus, Kashmir Bee Virus, Acute Bee Paralysis Virus; Fungal disease - Chalkbrood, Stonebrood; Protozoan disease - Nosemosis, *Nosema cerana*.

UNIT – IV Honey - its properties and application in various fields (15 L)

- Honey - its medicinal properties - application in various fields - other valuable by products of honey bees
- Value added honey products. Properties of honey products, Nutrients and composition of honey, Acid content and flavor effects.
- Types of value added honey products.

Term – II

UNIT – I Bee keeping: Tools and Equipment. (15 L)

- Basic requirements of Tools for starting bee keeping: Getting Started in Beekeeping - Land and Buildings, Equipment and supplies.
- Bee keeping equipment - introduction to types of bee boxes - BIS standard Tools used in apiculture.
- Bee breeding multiplication of colonies - Queen reaching technique.

UNIT – II Honeybee Plants and Floral Calendar. (15 L)

- Bee flora - importance propagation - congenial conditions for starting up of apiculture.
- Migratory Bee Keeping - designing floral Calendar
- Improved Agricultural practices - crop pollination - Pesticides impact on Honey bees.

UNIT – III Honey Processing and Bee Hive Products (15 L)

- Honey extraction & handling - Quality control standards - Honey testing kit
- Processing of honey. Other valuable by products of honey bees
- Bee venom & Royal jelly extraction.

UNIT – IV Economics of bee keeping (15 L)

- Economics in small scale and large scale bee keeping. Economic Value of Commercial Beekeeping.
- Preparing bankable bee keeping project: Steps involved in starting a beekeeping project, Funding sources for beekeeping projects.

PRACTICAL

Sr. No.	Particulars	Credit	L/Week
	Term I	**2**	**4**
01	To study the morphology of Honeybees and Identification of different species and classes of Honey bees		
02	To Study different stages in life cycle of Honey bees.		
03	To study the behavior of Honeybees		
04	Bee keeping unit - Handling of frames with colonies		
05	Introduction of parts of Bee box - ISI 'A' type 'B' type & Tools used in Bee keeping		
06	Colony inspection, maintenance - writing up of inspection report		
07	Identification of Queen cells, Drone cells & Brood		
08	Sugar feeding of colonies in scarcity period		
09	Identification of swarming tendency in a colony - Removal of Drone cells		
10	Identification of kinds of Queen cells.		
11	Methods of Multiplication of Bee Colonies		
12	Steps for strengthening of colonies - Requeening technique.		
	Term II	**2**	**4**
1	Bee flora - Propagation of bee plants - Preparation of floral calendar.		
2	Migratory Bee Keeping - measures to be taken while transporting colonies-Mapping of areas for migration.		
3	Extraction of Honey using Honey extractor, moisture reduction, packing and storing of Honey.		
4	Methods of Extraction of Bees wax, Royal Jelly and Bee venom.		

5	Honey testing kit - Physical and chemical methods of analysis.		
6	Fermentation and Granulation of Honey.		
7	Disease management - Identification of symptoms of Nosema. Sac brood Virus, Thai sac brood virus, American foul brood and European foul brood diseases.		
8	Preventive and control measures of the diseases.		
9	Application of antibiotics to colonies - Destruction of diseased colonies and disinfection of frames.		
10	Management of colonies for different hive products.		
11	Natural enemies and predators of Honey Bees - management involved.		

ONSITE JOB TRAINING (Credit – 8)

Management of *Apis melifers*

Every student has to undergo onsite job training considering following Aims:

Equipment, Procurement of Colonies, location and management during scarcity, Building up of the colonies, importance of drawn out combs, multiplication of colonies, Honey Flow management.

MODALITY OF ASSESSMENT:

Term End Theory Assessment –100% **100 marks**

1. Duration - These examinations shall be of three hours duration.
2. Theory question paper pattern:-
   a) There shall be **five** questions each of **20** marks. On each unit there will be one question & fifth one will be based on all the four units.
   b) All questions shall be compulsory with internal choice within the questions. Each question will be of **40** marks with options.
   c) Questions may be sub divided into sub questions a, b, c & d only, each carrying **10**marks **OR** a, b, c, d, e , f and g only each carrying **four** marks and the allocation of marks depends on the weightage of the topic.

Practical Examination Pattern: There will not be any external examination/ evaluation for practical.

Term end practical examination:-

Sr. No.	Particulars	Marks
1	Laboratory work	80
2	Journal	10
3	Viva voce	10

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head of the Department/ Co-ordinator of the department; failing which the student will not be allowed to appear for the practical examination.

N.B:

1. It is pertinent to note that we have to adhere strictly to the directions as given in the UGC Circular F14-4/2006 (CPP-II).
2. Apart from the institutional Animal Ethics Committee (IAEC) and any other Committee appointed by a Competent Authority/Body from time to time, every college should constitute the following Committees:
   I. A Committee for the Purpose of Care and Supervision of Experimental Animals (CPCSEA) and
   II. A Dissection Monitoring Committee (DMC)

Composition of DMC shall be as follows:

a. Head of the Concerned Department (Convener/Chairperson)
b. Two Senior Faculty Members of the concerned Department
c. One Faculty of related department from the same College
d. One or two members of related department from neighbouring colleges.

ANNEXURE -I

Suggested Field Visits

Field visits are to be organised to facilitate students to have first-hand experience and exposure to technology / production / functioning of an organisation / unit or witness a relevant activity. Each student must make at least 02 (Two) such visits to the units/markets/public aquarium out of 2 to 3 such visits organised by the college.

- Visit to one of the units with one or multiple activities such as, Honey bee Keeping / Honey Processing / Honey Marketing.
- Visit any production units such as, Honey Processing Unit or any Food industry

Government Offices such as

- National Bee Board (NBB), New Delhi.
- Central Bee Research and Training Institute, Khadi and Village Industries Commission, Pune.
- Vidya Pratisthan School of Biotechnology, Baramati.
- Maharashtra State Kahdi and Village Industries Board, Ratnagiri.

(Field visit is desirable to know the organization; however guest lecturers could also be helpful in understanding functioning).

ANNEXURE –II

Suggested Topics for Entrepreneurial Skill Development

1. Setting and Maintenance of Bee keeping unit.
2. Setting and Maintenance of Honey Processing unit.
3. Breeding and Multiplication of various bees.
4. Propagation of bee plants.
5. Preparing a proposal for starting a bee keeping and honey processing unit to a Bank or Government Authorities.

REFERENCES:

Reference Books

- Prospective in Indian Apiculture - R.C. Mishra
- Rearing queen bees in India - M.C. Suryanarayana et. al.
- Bee Keeping in India - G. K. Ghosh
- Technology and value addition of Honey - Dr. D. M. Wakhle and K. D. Kamble.
- ABC & XYZ of Bee culture - A. I. Root
- Indian Bee Journal - All India Bee Keeping Association
- Asian Bee Journal

Periodicals / Papers

- Dewey M. Caron, 2013. Honey Bee Biology and Beekeeping, Revised Edition. Wicwas Press, Kalamazoo.
- Pradip V Jabde, 1993. Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac Culture, Agricultural Pests and their Controls. Discovery Publishing House, New Delhi.
- Eva Crane, 1999. The World History of Beekeeping and Honey Hunting. Routledge, India.
- Ted Hooper, 2010. Guide to Bees & Honey: The World's Best Selling Guide to Beekeeping. Northern Bee Books, Oxford.
- Laidlaw, H.H., 1997. Contemporary queen rearing. Published by Dadant and Sons. R. A. Morse, Rearing queen honey bees. Wicwas press, NY.
- Alison Benjamin, By (author) Brian McCallum, 2008. Keeping Bees and Making Honey. David & Charles, Newton Abbot.
- Kim Pezza, 2013. Backyard Farming: Keeping Honey Bees: From Hive Management to Honey Harvesting and More. Hatherleigh Press, U.S.5
- Kim Flottum, 2014. The Backyard Beekeeper: An Absolute Beginner's Guide to Keeping Bees in Your Yard and Garden. Quarry Books.
- Roger A. Morse, Kim Flottum, 1998. Honey Bee Pests, Predators and Diseases. WicwasPr; 3rd edition.
- Alethea Morrison (Author), Mars Vilaubi (Photographer), 2013. Homegrown Honey Bees: An Absolute Beginner's Guide to Beekeeping Your First Year, from Hiving to Honey Harvest. Storey Publishing, LLC; 1 edition.
- Hunt, G.J., 2000. Using honey bees in pollination Purdue University.
- Craig Hughes, 2010. Urban Beekeeping: A Guide to Keeping Bees in the City. e Good Life Press, Preston.

- Ted Hooper, Clive De Bruyn, Margaret Thomas, 2014. The Beginner's Bee Book. Stenlake Publishing, Ayrshire.

Reference for Practical:

- David Cramp, 2012. The Complete Step-by-step Book of Beekeeping: A Practical Guide to Beekeeping, from Setting up a Colony to Hive Management and Harvesting the Honey. Lorenz Books. London.
- David Cramp, 2009. A Practical Manual of Beekeeping: How to Keep Bees and Develop Your Full Potential as an Apiarist. Spring Hill, London.
- Ted Hooper, 2010. Guide to Bees and Honey: The World's Best Selling Guide to Beekeeping. Northern Bee Books. Oxford.8
- David Cramp, 2012. The Complete Step-by-step Book of Beekeeping: A Practical Guide to Beekeeping, from Setting up a Colony to Hive Management and Harvesting the Honey. Lorenz Books. London.

WEB ADDRESS:

http://nbb.gov.in/

www.kvic.org.in

www.honeyflow.com

https://practicalaction.org/docs/technical_information_service/honey_processing.pdf

YOU TUBE VIDEOS LINKS:

https://www.youtube.com/watch?v=1rhm4uvkcUs

https://www.youtube.com/watch?v=I6E0yB0Ev0o

https://www.youtube.com/watch?v=RCfNGl4aO4Y

https://www.youtube.com/watch?v=J0bl0HqN4Nk

https://www.youtube.com/watch?v=GMfCGhyS7fw