Scientific Research Methodology
Two-Week Massive Open Online Course (MOOC) developed under The UNESCO Open Education for a Better World (OE4BW) - Online Mentoring Programme

Course Mentor:
Dr. Madhuri Isave
Associate Prof., Tilak College of Education, Pune, Maharashtra, India

Course Developer:
Dr. Roshan D'Souza
Associate Prof. & Head Department of Zoology, Sophia College (Autonomous), Mumbai – 400 026, Maharashtra, India

Hub Co-Ordinator: Samantha Ahern
Faculty LT Lead (Bartlett), UCL

OE4BW EDUSCOPE 2022
SEPTEMBER 20 – 22, 2022 VIPAVA, SLOVENIA
### COURSE FOCUS

- Scientific Research Methodology course emphasized on a **holistic approach to organizing the research activity** that ensures selecting the correct research techniques as well as the other elements of the scientific research process such as research ethics and research publication ethics.

- **Rejuvenating the research culture in academics** that was disrupted due to the COVID-19 pandemic

### UNIQUE FEATURES

- About 3 to 4 hours per week of learner’s engagement
- Demo videos for course registration on Canvas LMS, navigation through Course and assignment submissions
- Live Interaction session via Zoom platform to facilitate understanding
- Criteria for successful completion:
  - Submission of all the activities and the assignments
  - Minimum 60% score in each of the activities and the assignments
• The online course with a flexible asynchronous learning mode
• Open to all the undergraduate and postgraduate students of science faculty who could get foundation knowledge and relevant skills for research-based careers such as research fellows, research communication and publication
• Rejuvenating the research culture in academics that was disrupted due to the COVID-19 pandemic
• Open to all the teachers who could get trained in research methodology which could be resourceful for promoting research-based pedagogy that imparts critical thinking and offers autonomy to learners for addressing a given scientific problem systematically
**Course Objectives:**

- To understand the concept of Scientific Research Methodology
- To gain knowledge about the elements of research methodology
- To be able to design the experiment keeping to the ethical guidelines
- To apply the scientific writing skills while preparing the manuscript for research publication
- To implement and evaluate the important aspects of ethics in research publication

**Course Learning Outcomes:**

- Differentiate between research methods and research methodology
- Relate between the various elements of research methodology
- Write a research proposal having an experimental design that follows the ethical guidelines
- Prepare a manuscript for a research paper to be published taking into consideration the related ethics
<table>
<thead>
<tr>
<th>WEEK 1</th>
<th>MODULE 1 M1</th>
<th>INTRODUCTION TO BASICS OF RESEARCH METHODOLOGY</th>
</tr>
</thead>
</table>
| Module Objectives:  
• To understand the concept of research methodology and types of research  
• To gain knowledge about the ethical guidelines related to different types of scientific research  
• To relate the various elements of research methodology  | M1.1 | Research – A systematic process of enquiry |
| Module Outcomes:  
• To be able to differentiate between research methods and research methodology  
• To be able to design an experiment having the required elements of research methodology and applying the ethical guidelines | M1.2 | Types of research |
<p>| | M1.3 | Ethical guidelines in animal research, clinical research, and wildlife research |
| | M1.4 | Elements of Research methodology – Part 1: Research problem, Hypothesis, Variables |
| | M1.5 | Elements of Research methodology – Part 2: Experimental Design, Data Documentation and Analysis |
| | M1.6 | Summary |</p>
<table>
<thead>
<tr>
<th>WEEK 2</th>
<th>MODULE 2</th>
<th>IMPORTANT ASPECTS OF SCIENTIFIC WRITING</th>
</tr>
</thead>
</table>
| Module Objectives:  
• To understand the structure and components of a research article to be published  
• To understand and apply the ethics in publication while preparing a manuscript | M2.1 | Structure and components of a research paper |
| | M2.2 | Manuscript preparation |
| | M2.3 | Reference Writing Systems |
| | M2.4 | Ethics in publication: Part 1: Plagiarism & its types |
| | M2.5 | Ethics in publication: Part 2: IPR & Conflict of Interest |
| | M2.6 | Summary |
MOOC developed under The UNESCO - OE4BW - Online Mentoring Programme

Learning Trajectory

Pre-course survey and Introduction

Activities through Graded Discussion Forum Question

Graded weekly assignments & Quizzes with unlimited attempts

Short interactive video lectures with reflection spots

Ungraded knowledge quizzes as practice by doing

eResources

Open Source reference articles

eBooks

Website URLs

PPT with images (DM)

YouTube Video links of Interactive lecture videos (DM)

WordCloud & Concept Map (DM)

Pdf of the entire course material shared at the end of course (DM)

(DM) : Developer Made
# Course Registration Statistics

## Geographical Diversity

- Andhra Pradesh: 20\%
- ASSAM: 21.4\%
- Delhi: 61.4\%
- Haryana: 12.9\%
- J&K: 11.4\%
- Maharashtra: 15.7\%
- Orissa: 11.4\%
- Punjab: 27.1\%
- RAJASTHAN: 45.7\%
- Tamil Nadu: 4.5\%
- U.P: 6.1\%
- Uttarakhand: 1.5\%
- Australia: 4.5\%
- Oman: 4.5\%

## Gender

- Female: 80\%
- Male: 20\%
- Prefer not mentioning: 0\%

## Age Group

- 18-20: 21.4\%
- 30-39: 61.4\%
- 40-49: 15.7\%
- 50-59: 11.4\%
- 60+: 11.4\%

## Qualification

- Secondary (12th grade): 45.7\%
- Bachelors: 4.5\%
- Masters: 4.5\%
- Doctorate: 11.4\%
- Post-Doc: 11.4\%

## Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student</td>
<td>39</td>
<td>55.7%</td>
</tr>
<tr>
<td>Ph.D. / Research Scholar</td>
<td>17</td>
<td>24.3%</td>
</tr>
<tr>
<td>In-service Teacher</td>
<td>19</td>
<td>27.1%</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td>-2</td>
<td>2.9%</td>
</tr>
<tr>
<td>PHYSICAL TEACHER</td>
<td>-1</td>
<td>1.4%</td>
</tr>
</tbody>
</table>

## Subject Disciplines

<table>
<thead>
<tr>
<th>Subject</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS</td>
<td>38</td>
<td>51.4%</td>
</tr>
<tr>
<td>CHEMISTRY</td>
<td>-7</td>
<td>10%</td>
</tr>
<tr>
<td>LIFE SCIENCES</td>
<td>-3</td>
<td>4.3%</td>
</tr>
<tr>
<td>MATHEMATICS</td>
<td>-3</td>
<td>4.3%</td>
</tr>
<tr>
<td>TECHNOLOGY</td>
<td>-3</td>
<td>4.3%</td>
</tr>
<tr>
<td>OTHER</td>
<td>-31</td>
<td>44.3%</td>
</tr>
</tbody>
</table>

## Enrollment

<table>
<thead>
<tr>
<th>Month</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>54</td>
</tr>
<tr>
<td>July</td>
<td>124</td>
</tr>
<tr>
<td>Total</td>
<td>178</td>
</tr>
</tbody>
</table>

## Completed

- June: 17
- July: 53
- Total: 70

---

The UNESCO - OE4BW - Online Mentoring Programme
Active Students 174
Discussion Posts 415
Quiz Submissions 573
Course Activities were engaging the learners in the learning process.
Interaction through CANVAS Messages, e-mail, Telegram, WhatsApp was beneficial.
Course practice quizzes were helpful.
Course assignments helped to apply theory into practice.
Course discussion forums were good source of learning from others.
Feedback on Skill and Responsiveness of the Course Instructor/Developer

- Presentation of Content was clear and organized: Strongly Agree
- Course teacher stimulated my interest: Strongly Agree
- Course teacher was an effective lecturer/demonstrator: Strongly Agree
- Useful and prompt feedback was ensured through discussion forums and Instant Messaging: Agree
- Course teacher was accessible through different modes (CANVAS Messages, E-mail, Phone, Telegram, WhatsApp etc): Strongly Agree

70 responses
Reflections on the learnings from the course

- I can say that course content and learnings during 2 weeks is more important as compared to the certificate from this course.
- I can utilize all resource material for my research career.
- I can help my colleagues to understand research ethics.
- I can motivate and guide my colleagues to use it for innovative pedagogy.
- I can incorporate research methodology in my teaching for innovative pedagogy.

70 responses
allowed to clot for 30 minutes. It was then centrifuged at 3000 rpm for 20 minutes. Serum was then collected and stored at -20°C for further biochemical analysis.

- **Biochemical assays:**
  Biochemical assays of enzyme activities and that of metabolic parameters were carried out using Diagnostic Reagent Kit.

**Results**

Sub-acute treatment of 15 days duration caused a significantly decreased ACP levels whereas increased the ALP levels, which indicate renal as well as the hepatic toxicity. Similar

1. Kindly mention about the ethical permissions obtained for use of animals in the study.
2. Please specify which species of animals were used.

Kindly provide the details of the kit such as name of the company manufacturing kit

1. Please present the results in graphical format
2. Kindly add the section of Discussions and elaborate your interpretation of results with proper citations.
3. Please add short conclusion that summarize the major findings of your study.
Learners’ Activities

ASSESSMENT OF POTENTIAL CLINICAL APPLICATION OF CANTHARIS Q THROUGH SERUM BIOCHEMISTRY OF MALE ALBINO RATS TREATED FOR THE DURATION OF 15, 30 AND 60 DAYS AND ALSO THE RECOVERY

D’Souza R. C.¹, & Athalye R. P.²

ABSTRACT

Cantharis Q is a crude alcoholic extract of blister beetle Lytta vesicatoria which is commonly known as Spanish fly. Lytta vesicatoria of Fabricius is a beetle belonging to Phylum Arthropoda, Class Insecta, Order Coleoptera, Family Meloidae. It is commonly called The Spanish fly. These beetles carry a venomous substance diffused throughout their body, especially in their blood called cantharidin. Cantharidin is a polyetheramine and polyetheralcohol with lethal effects. It can cause localized skin irritation and painful localized burns. It is used as a vehicle for freeze-drying drugs and as a lytic agent. It is used to treat about 10,000 cases of burns annually in the USA.

Assessment Comments

Dear Akshay, Well done! You have done a very comprehensive review of the sample paper.
I would like you to also notice the following:
1. Abstract should not have citations
2. check if extra references are in the lit, as then it becomes Bibliography
3. In the acknowledgement section, the authors are also thanking lab staff, friends, family etc. which is not expected to be written in the in this section.

Roshan D’Souza, Jun 25 at 7:10am
Assessment of potential clinical application of Cantharis Q through serum biochemistry of male albino rats treated for the duration of 15, 30 and 60 days and also the recovery

D’Souza R. C. 1 & Athalye R. P. 2

Abstract

Cantharis Q is a crude alcoholic extract of blister beetle Lytta vesicatoria which is commonly known as Spanish fly. Lytta vesicatoria of Fabricius is a beetle belonging to Phylum Arthropoda, Class Insecta, Order Coleoptera, Family Meloidae. It is commonly called 'The Spanish fly.' These beetles carry a venomous substance diffused throughout their body, especially in their blood called cantharidin, a potent chemical that possesses caustic or blistering properties when the insects are accidentally crushed or handled roughly (Aiello, 1998). Alcoholic extract of Lytta vesicatoria, in homeopathy, is used in a diluted potentized form for treatment of many disorders such as baldness, rheumatism, burning and cystitis, kidney and genital disorders (Ellwooding, 1919). At what period these beetles were introduced into the practice of medicine is a matter of uncertainty and few find their most prominent sphere of action in exciting the animal passions. The crude alcoholic extract of these beetles called Cantharis Q leads to irritation, i.e. pain with burning due to vasication and produces unbounded sexual desire also sexual erethism and excitability. Genito – urinary systems come under its sphere of action (Clarke, 2000).

https://canvas.instructure.com/courses/4924677/gradebook/speed_grader?assignment_id=30761819&student_id=34916694#nogo
Learners’ Activities

Dr. M is a Ph.D. supervisor and has one of his research students applying for a grant at an organization that is funding the similar type of research. Dr. M. will be the Principal investigator and his student will be the co-investigator for this research study. Dr. M has his brother on the scrutiny and selection committee for approving the proposal and giving the funding at this organization. Do you think Dr. M. should be encouraging his student to submit the proposal at this organization?

Please state your answer with respect to the ethics involved in this case, if any and its type. You have to justify your answer in 2-3 sentences. You must also respond to at least one comment other than yours in at least 2 sentences.

Please note that this is a graded discussion and the scores will be considered for final grading. Your own response and for the other’s post is mandatory for the completion of this activity.

Chaitali Bajpai

Yes, he will encourage his student to submit the proposal for getting the funds for his research work. As Dr. M’s brother is in the selection committee he will definitely encourage his student to submit the proposal for funding so that he can take the help of him in approving the proposal. This will also show the interest of student in research work and he can judge him on the basis of proposal for funding.

Ayushi Shukla

I don’t think that Dr. M should encourage his student to apply to the same organization where his brother is on the scrutiny and selection committee for approving the proposals since it may create a sought of favouritism where there is a high likelihood that his brother can give unfair preferential treatment to Dr. M’s student and there might not be a fair chance for others. This is also not good for Dr. M’s student since his student will not be able to learn.
I don't think Dr. M should encourage his student to apply to the same organization where his brother is on the scrutiny and selection committee for approving the proposals since it may create a bias of favoritism where there is a high likelihood that his brother can give unfair preferential treatment to Dr. M's student and there might not be a fair chance for others. This is also not good for Dr. M's student since his student will not be able to learn.

If a student has done hard work and followed all required guidelines of the organization and proposal, it is very much fair and definitely Dr. M should encourage his student for approval according to me which do not require any favoritism and which is without any bias so it is acceptable.

Regarding the students' efforts, I agree with you. Since Dr. M wants to offer his student a fair chance, he should really avoid writing his name anywhere in the project. If the name appears anywhere on the project, it is clear that the choice will be made one way or the other. Whenever the work is finished, the student can acknowledge Dr. M for his cooperation and support.

I agree. If the student has worked according to the guidelines provided for proposal then there are fair chances to get the approval.
Impact of the Course

At Personal Level
1. Rich experience gained for OER creation through guidance of Mentor & Hub-Coordinator
2. Interaction with diverse learners
3. Opportunity to curate resources as per learners’ needs

At Learners’ Level
1. Knowledge about the importance of systematic research process & its elements
2. Insights into research ethics, Plagiarism & Conflict of Interest
3. Peer interaction through DF and live interaction session
4. Variety of learning resources

Future Prospects
1. Launching the course on a larger platform
2. Implementing this course as a hybrid mode of learning
3. Advanced course based on other aspects of research methodology

The UNESCO - OE4BW - Online Mentoring Programme
Thank you for the opportunity and
Your kind attention

* * * * * * * * * * * * * * * * * * * * * * * * * *

Course Developer: Roshan D’Souza
Course Mentor: Madhuri Isave