

PROGRAMME GUIDE

CERTIFICATE IN CONDITION MONITORING (CCOMO)



**School of Engineering and Technology
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
Maidan Garhi, New Delhi - 110068**

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Further information on the Indira Gandhi National Open University courses may be obtained from the University's office at Maidan Garhi, New Delhi-110 068.

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RECOGNITION

IGNOU is a Central University established by an Act of Parliament in 1985 (Act No. 50 of 1985). The Degrees/Diplomas/Certificates awarded by IGNOU are recognized by all the members of the Association of Indian Universities (AIU) and to be treated at par with Degrees/Diplomas/Certificates of all Indian Universities/Deemed Universities/Institutions vide UGC Circular No. F. 1-8/92 (CPP) dated February 1992 and AIU Circular No. EV/B(449)/94/176915-177115 dated January 14,1994.

1. THE UNIVERSITY

Indira Gandhi National Open University (IGNOU) was established in 1985 by an Act of Parliament to achieve the following objectives:

- Democratizing higher education by taking education to the doorsteps of the students
- Providing access to high quality education to all those who seek it, irrespective of age, region, or formal qualifications
- Offering need-based academic programmes by giving professional and vocational orientation to the courses
- Promoting and developing distance education in India
- Setting and maintaining standards in distance education in the country as an apex body for the purpose.

Objectives of the University

The University has the following major objectives:

- Promoting the educational well-being of the community;
- Democratizing higher education by providing easy access to all those who desire to improve their qualifications, skills and competence by taking education to the door- steps of people living even in remote areas;
- Offering need-based innovative academic programmes by giving professional and vocational orientation to the course curriculum;
- Disseminating learning and knowledge through an innovative multiple media teaching-learning system.

IGNOU has now emerged as the largest University in the world. It is mandated to cover large segments of population across the length and breadth of the country particularly the disadvantaged groups of society engaged in various vocations and professions.

The University follows a learner-centric approach. It has successfully adopted a policy of openness and flexibility in terms of relaxed entry qualifications and provision for multiple entry and exit, pace, place of study, etc. At present, IGNOU is offering more than 200 programmes and has over 2 million students on its roll. The University operates through a strong network of Regional Centers and Study Centers/Programme Study Centers across the country, which provides individualized support to the learners. Most of these centres are equipped with the state-of-the-art teleconferencing facility. The University produces high quality and rich content courseware for its learners for which the IGNOU was conferred an Award of Excellence for Distance Education Materials by the Commonwealth of Learning (COL), Canada.

Academic Programmes

The University offers short-term non-credit programmes as well as wide range of programmes leading to Certificate, Diploma or Degree, covering conventional as well as innovative programmes. Most of these programmes have been developed after an initial survey of the demand for such studies. They are launched with a view to fulfill the student's needs for:

- Certification
- Improvement of skills
- Acquisition of professional qualifications
- Continuing education and professional development at workplace
- Self-enrichment

- Diversification of knowledge, etc.

2. SCHOOL OF ENGINEERING AND TECHNOLOGY (SOET)

The School of Engineering and Technology has the responsibility of initiating academic, continuing and extension education programmes in the areas of engineering and technology. The school has developed several programmes aimed at increasing job potential and economic advantage to the learners. To fulfill its mandate, the school regularly interacts with employing agencies, professional bodies and industry so as to reflect educational and training needs of the targeted learner group in the curriculum. The school practices participative and collaborative strategy by inviting different industries.

The instructional packages are designed and developed with the help of experts drawn from various institutions like IITs, National Institutes of Technology (NITs), Universities, Engineering Colleges and Industry. The school has forged alliances with the Construction Industry Development Council (CIDC), Directorate General of Shipping (DGS), Khadi and Village Industries Commission (KVIC), Footwear Design and Development Institute (FDDI), Ministry of Power (MoP), and Hero Honda Motors Ltd. (HHML), etc. to design, develop and conduct tailor-made courses to meet the specific needs of respective employment sectors.

3. CERTIFICATE IN CONDITION MONITORING

SOET offers Certificate in Condition Monitoring (CCOMO) with the following broad objectives:

- Programme aims to develop skilled human resources in the field of condition monitoring at the Local, Regional and National levels.
- It seeks to build competencies and professional skills to avail enhanced employment opportunities in organizations.
- It aims to upgrade the knowledge and skills of those working in an organization without a formal training.

Credit System

The University follows the 'Credit System' for most of its programmes. Each credit amounts to 30 hours of learner study comprising learning and assessment activities, viz. reading and comprehending the study material, listening audio, watching video, attending counseling sessions, teleconferencing, writing assignment, referring books in library, discussions with peer group and sessions practical, if any. Completion of this academic programme requires successful completion of the all assignments, Term end examination (TEE) of all courses, project and field training, where ever applicable.

Details of the Programme

Some pertinent details of the programme are given below:

Programme Duration	6 Months (Minimum) and 2 Years (Maximum)
Programme Fee	9300/-
Eligibility	B Tech Mech/Aero/Civil and BSc Physics and Maths
Age	No bar
Medium of Instruction	English

Programme Structure of CCOMO

There are four courses in the programme. Table 1 gives the details of the programme structure of CCOMO

Table 1: Programme Structure of the CCOMO

Sr. No.	Course Code	Title of the Course	Type of Course: Compulsory/ Optional	Credits
1	MET001	Metrology, Instrumentation and Tribology	Compulsory	4
2	MET002	Mechatronics	Compulsory	4
3	MET003	Condition Monitoring and Maintenance	Compulsory	4
4	MST005	Statistical Techniques	Compulsory	4

The details of course structure of “Certificate in Condition Monitoring (CCOMO)” is given below:

Course Code: MET001

Course Title: Metrology, Instrumentation and Tribology

Block 1: Principles of measurement and measuring techniques

Unit 1- Standard of Measurement

Unit 2- Errors in Measurement

Unit 3- Fits and Tolerances

Unit 4- In process Gauging

Block 2: Measuring Instrumentation

Unit 5- Linear Measuring Devices and Comparators

Unit 6- Angular Measuring Devices

Unit 7- Projection and Tool Maker’s Microscope

Unit 8- Coordinate Measuring Machines

Unit 9- Interferometry

Block 3: Tribology

Unit 10- Wear and Tribology

Unit 11- Surface treatment and Coatings

Course Code: MET002

Course Title: Mechatronics

Block 1: Sensors and Transducers

Unit 1- Introduction to transducers and sensors

Unit 2- General characteristics of transducers and Sensors

Unit 3- Transducers, Applications and Selection

Block 2: Actuation Systems-Mechanical

Unit 4- Mechanical, Hydraulic and Pneumatic Actuation Systems

Unit 5- Hydraulic Power Pack, Pumps and Compressors

Unit 6- Control Valve and Actuators

Unit 7- Ancilliary Devices and Design of Circuits

Block 3: Actuation System: Electrical

Unit 8- Electrical Devices

Unit 9- Control Systems

Unit 10- Input and Output Devices

Block 4: Programmable Logic Controllers

Unit 11- PLC Structures and Languages

Unit 12- Programming of PLC

Unit 13- Interfacing PLC with actuators

Unit 14- Open Loop and Closed Loop Control Using PLC

Course Code: MET003

Course Title: Condition monitoring and maintenance

Block 1: Maintenance Concepts

Unit 1- Functions and Objectives of Maintenance

Unit 2- Maintenance Strategies

Unit 3- Maintenance Schedules

Unit 4 – Spare Part Management

Block 2: Condition Based Maintenance

Unit 5- Diagnostic Maintenance

Unit 6- Condition Monitoring

Unit 7- Vibration of Mechanical Systems

Unit 8- Single Degree of Freedom Systems

Unit 9- Isolation, control and introduction to vibration measuring instruments

Unit 10- Trend Analysis

Block 3: Reliability Centred Maintenance

Unit 11- Maintenance Model

Unit 12- Reliability Oriented Maintenance Model

Unit 13- Total Productive Maintenance and Benchmarking

Course Code: MST-005

Course Title: Statistical Techniques

Block 1: Sampling Designs

Unit 1-Introduction to Sample Surveys

Unit 2- Simple Random Sampling

Unit 3- Stratified Random Sampling

Unit 4- Some Other Sampling Schemes

Block 2: Analysis of Variance

Unit 5- Introduction to Analysis of Variance

Unit 6- One-Way Analysis of Variance

Unit 7- Two-Way Analysis of Variance

Unit 8- Two-Way Anova with m Observations Per Cell

Block 3: Design of Experiments

Unit 9- Completely Randomised Design

Unit 10-Randomised Block Design

Unit 11- Latin Square Design

Unit 12- Factorial Experiments

Block 4: Random Number Generation and Simulation Techniques

Unit 13- Random Number Generation for Discrete Variables

Unit 14- Random Number Generation for Continuous Variables

Unit 15- Simulation Techniques

Unit 16- Applications of Simulation

4. PROGRAMME DELIVERY

The programme delivery mechanism for the Certificate in Condition Monitoring (CCOMO) shall be as follows:

- The programme will be delivered by the School of Engineering & Technology, IGNOU.
- The admitted students will get the academic support (counseling sessions, assignments submission etc.) through online mode.
- There will be one assignment for each course MET001, MET002, MET003 and MST005

5. STUDENT SUPPORT SERVICES

Learners will get all necessary academic as well as administrative supports as listed below:

- Information, counseling and advice on selected and other academic programmes offered by the University.
- Induction training for newly enrolled students
- Schedule of academic counseling

- Library facility
- Receipt, evaluation, feedback and marking for submitted assignments
- Attention on academic and administrative queries pertaining to registration, examination, assessment etc.

6. INSTRUCTIONAL SYSTEM

The Open University system is more learner oriented and the learner is an active participant in the pedagogical (teaching and learning) process. Most of the instructions are imparted through distance education methodology.

Study Material: Study material of the programme will be supplied to the learners in digital format.

Academic Counseling: Counseling sessions will be held through online mode. The schedule of counseling will be intimated to the learner.

Assignments: Learners are required to write responses for questions in assignments based on understanding of courses, discussions and interactions with counselors & among fellow learners. Learners are required to submit assignment responses of each course to SOET at the address of Programme Coordinator. The marks received in assignments will be considered for preparing final marks of respective course. The weightage of assignment marks will be 30% for each course. Learners must devote enough time for preparing and writing assignment responses as per the guidelines of the university. They should prepare assignment responses by own. At the same time they are also advised not to get tempted to reproduce the course material given in the units or assignments responses of others.

While preparing assignments response learners should remember following points:

- Read assignment questions carefully and accordingly, write answers precise, concise and systematic.
- Supplement answers with examples, illustrations and real life situations with activities which will help you acquiring better knowledge and skills.
- Follow the words limit, if indicated in the assignment and drafting, re-drafting assignment responses till final draft of response.
- Write answers in own handwriting and don't send typed assignments.

7. INSTRUCTION FOR SENDING ASSIGNMENT RESPONSE

While sending the assignment responses the following points should be taken care:

- Partial or incomplete assignment will not be considered for any credit.
- Use A4 size paper for writing your responses and leave a margin of about 2 ½ inches on the left side for writing tutor comments and providing feedback
- Always retain a copy of the assignment response with you as a precautionary measure.
- The assignment should be submitted to the SOET at address to the programme coordinator on or before the last date indicated in the schedule given by the university. If the last date for submission of assignment falls on a holiday, the same may be submitted on the next working day.
- Do not forget to write enrolment number, name and full address at the centre of the 1st page of assignment response.
- The course for which the assignment has been done, its Course Code No. and Assignment Code should be written in capital letters at the centre of the 1st page of the response sheets.
- The top left-hand corner should be kept for office use.

The top of the 1st page of your response(s) should look something like this:

Programme Name _____
Programme Code _____
Course Title _____
Course Code _____
Assignment Code _____
Enrolment No _____
Name _____
Address _____
Telephone _____
E-Mail _____
Date of Submission _____

Resubmission of assignment responses is not permitted for improvement of grade/marks. Assignments are not subject to re-evaluation except factual errors, if any.

8. TERM END EXAMINATION

Term End Examination (TEE) is another evaluation tool in the CCOMO programme. The university conducts TEE twice in a year in the month of June and December. Learners will be allowed for TEE of the course(s) subject to fulfillment of all requirements as mentioned in guidelines. A prescribed examination fee has to be paid to appear in Term End Examination. Learners are required to submit online examination form as per the guidelines through university website (www.ignou.ac.in). The written examination will be held for courses MET001, MET002, MET003 and MST005. The last dates for submitting the filled in examination forms are as follows:

Examination Months	Dates for Submission of Examination Forms	
	Without Late Fee	With a Late Fee* of Rs. 1000
June	1st February to 31st March	1st April to 10th May
December	1st August to 30th September	1st October to 10th November

*The dates/fee may change. Please visit websites for the update.

University will upload the hall ticket/intimation slip on the university website after scrutinizing all successfully submitted examination form. Learners are required to download the same and report to the allotted exam centre for appearing in examinations on indicated date & time as given in hall ticket. Final term end examination will be conducted at selected IGNOU examination centres.

Learner enrolment number is Roll Number for examinations. Learners should be careful in writing it. Any mistake in writing the Roll Number will result in non-declaration of result.

To be eligible to appear at the Term End Examination in any course, you are required to fulfill the following conditions:

- Submitted assignment responses for the respective courses.
- Examination form submission in time to write examination for particular course(s).
- Have valid registration at the time of submission of examination form.

- Fulfill minimum duration of the programme criteria.

Examination date sheet and schedule which indicates the date and time of examination for each course is sent to all the Study/ Exam Centers in advance. The same is also notified through **IGNOU Website** from time to time.

It is essential pre-requisite to submit the online examination form for appearing in examination in any course. For appearing in a TEE, only one examination form is required irrespective of number of course(s). Learners are required to pay examination fee per course as prescribed by university.

9. EVALUATION METHODOLOGY

IGNOU has a multi-tier system of evaluation than that of the conventional evaluation system as:

- Continuous evaluation mainly through assignments which are tutor marked assignments.
- The Term End Examinations.

The weightage of TMA (Tutor Mark Assignments) and TEE for each course of programme is 30% and 70% respectively in the overall evaluation scheme of the programme.

A student will be awarded marks for the TMAs and for Term End Examination (TEE) part for each course. To clear a course, a student will have to clear both the segments of the course. The passing marks shall be 40 % for both the assignments and the term end exam.

10. OTHER IMPORTANT INFORMATION

Admission Schedule

The CCOMO programme is available in both July and January Cycles of admissions. Application form can be submitted on the online admission portal of university:

<https://ignouadmission.samarth.edu.in>

Programme Fee

The programme fee of CCOMO is Rs.9300/-. The fee is to be paid through credit/debit card/net banking.

Useful Hints

- Please read the Programme Guide thoroughly and keep it handy. It contains most of the information, likely to need during your perusal of the programme.
- Please keep a record of all the information/letters/communication received from and sent to the University.
- Do write to us if you face any problem while working through the programme. Please write briefly and neatly for a quick redressal of your problem.
- In the case of change of address inform the relevant authorities well in advance.
- To get the best out of the programme, maintain a time-table and stick to it. Make the time-table realistic taking into account some unforeseen situations, such as illness, official work, social obligations etc.
- Be regular in your work and devote at least two hours of study every day.
- Use the prescribed forms appended in Annexure for different purposes to facilitate prompt action.

- Whenever learners have to correspond with the University, please get the photocopy of the relevant form, fill it carefully and sent as per instructions therein. The detailed instructions for all these forms are provided in this programme guide in different sections. Here is the link to important forms: <http://ignou.ac.in/ignou/studentzone/forms/2>

11. CONTACT PERSONS

For any clarification and help, you may contact the Programme Coordinator at the following addresses:

Dr Shashank Srivastava
 Programme Coordinator
 School of Engineering and Technology,
 IGNOU, Maidan Garhi, New Delhi - 110068
Contact:+91-11-29572920 (O), +919560830219 (M)
E-mail: sssrivastav@ignou.ac.in

WHOM TO CONTACT FOR WHAT?

- For identity card, fee receipt, change of address, bonafide certificates, migration certificate, scholarship forms, non-receipt of study material and assignments contact the concerned Regional Centre.
- For assignments, you can download the same from IGNOU website www.ignou.ac.in. or go to link <https://webservices.ignou.ac.in/assignments/>
- For non-reflection of assignment grades/marks in your grade card, contact the Regional Director of the concerned Regional Centre and Assistant Registrar (Assignments), Student Evaluation Division (SED), Block 3, Room No. 12, IGNOU, Maidan Garhi, New Delhi- 110068, (E-mail: assignments@ignou.ac.in; Phone: Extn.1312/1319/1325).
- For queries relating to examinations, date sheets, hall ticket, contact AR, Exam II. For result, early declaration of results, transcripts, rechecking, grade card, provisional certificate you can contact Dy. Registrar(Examination III), SED, Block 12, Room No.1, IGNOU, Maidan Garhi, New Delhi-110068 (Phone: Extn. 2201/ 2211).
- For Original Degree/Diploma/Verification of Degree/Diploma, Convocation, contact the DR (Exam I) SED, IGNOU, Block 9, Maidan Garhi, New Delhi-110068.
- For student grievances there is an online portal where you can voice your concern (link: <http://igram.ignou.ac.in/>) or contact the Section Officer (Student Grievances), SED, Block 6, Room No. 14, IGNOU, Maidan Garhi, New Delhi -110068 (email: sregrievances@ignou.ac.in).
- For purchase of Audio-Video programmes contact the Marketing Unit, EMPC, IGNOU, Maidan Garhi, New Delhi 110068 (email:empcmkunit@ignou.ac.in; Phone: 29536129, 29573210). Programmes are also available on E Gyankosh and You Tube.

- For the Schedules of counseling, feedback on assignment responses contact the Coordinator/
Programme In-charge of the concerned Programme Study Centre.