

**Detailed Project Report (DPR)**  
**for the declaration of**  
**Inter-University Centre for Astronomy and Astrophysics (IUCAA),**  
**as a Deemed-to-be-University**



**February 2024**

**PUNE**

## **EXECUTIVE SUMMARY**

Inter-University Centre for Astronomy & Astrophysics (IUCAA) was set up in 1988 by the University Grants Commission under Section 12 (CCC) of its Act (No.3 of 1956) and Regulations (establishment and maintenance of Institutions) 1985.

The proposal envisages to expand the mandate of the Inter-University Centre for Astronomy and Astrophysics (IUCAA) at Pune, towards the formation of a Deemed-to-be-University (DTBU) and assume extended responsibilities of imparting education, in the areas of Astronomy & Astrophysics, at the postgraduate level. The courses being proposed for awarding the Master of Science (M.Sc.) degree are in Physics with Astrophysics and Physics with Computational Astrophysics. In addition, the DTBU will host an Integrated M.Sc.-Ph.D. programme in Physics with Astrophysics, as well as Ph.D. programmes in Physics with Astrophysics and Physics with Gravitational Science. IUCAA, while upholding its initial mandate as an Inter-University Centre, has been facilitating the national academia, particularly at the teaching institutions, with access to state-of-the-art research facilities along with expertise in the associated pursuits and training for development of skilled manpower at the service of the nation. In the process, IUCAA has supported doctoral research programmes in physical sciences, in particular in specialised areas such as Astronomy & Astrophysics, Gravitation & Cosmology and Astronomical Instrumentation. The proposition to evolve into a DTBU framework retains the identity, scope and mandate of IUCAA while enabling it to be part of a shared objective of the nation in its pursuit of higher education in science, with the unique advantage of adding specialized subjects such as astrophysics, cosmology and gravitational sciences. The proposed courses are aimed at providing students with the most comprehensive exposure to advanced research-oriented curriculum. The emergent system of research and application-oriented advanced science education is commensurate with the aspirations embedded in the National Education Policy (NEP) and will create expert human resources towards the realization of several mega-science projects and national missions undertaken by our country in the larger cause of the benefit of the nation and the society.

The IUCAA is fully funded by UGC under the Ministry of Education (earlier MHRD), and in the event of the declaration as a 'Deemed-to-be University' under the 'Distinct Category' with the focus on research and teaching addressing the strategic needs of the country besides fulfilling its mandate as per the University Grants Commission (Institutions deemed-to-be-Universities) Regulations, 2023, IUCAA- Deemed-to-be-University shall continue to receive the grants from the Central Government (Ministry of Education) through University Grants Commission in continuance with the earlier arrangement from its inception.

## **PREAMBLE**

Autonomous Institutions (AIs) were established by the Government of India, towards accomplishing time bound deliverables in academia. The AIs have been facilitated with reasonable operational and financial autonomy while retaining the spirit of supervision rendered through directives/advisories from Government. Inter-University Centres (IUCs) were created by the University Grants Commission (UGC) with the objective of empowering the national teaching fraternity with access to research and auxiliary facilities in advanced fields. Of these IUCs, the Inter-University Accelerator Centre (IUAC) at New Delhi, Inter-University Centre for Astronomy and Astrophysics (IUCAA) at Pune and UGC-DAE Consortium for Scientific Research (UGC-DAE CSR) with headquarters at Indore, were particularly mandated to establish and/or provide state-of-the-art, internationally competitive facilities for science research, that would be conveniently available to the teaching fraternity in pursuit of their academic aspirations and in furtherance of their capabilities.

The Inter-University Centre for Astronomy & Astrophysics (IUCAA), Pune is one of the IUCs setup in the year 1988 to provide a centre of excellence within the University sector for teaching, research and development in Astronomy & Astrophysics, as well as to promote nucleation and growth of active groups in this area in Universities. Besides conducting a vigorous research programme of its own, IUCAA has enabled faculty members and students from various Indian Universities to visit it for various durations for participating in research work and executing development projects. In particular, IUCAA is providing access to state-of-the art astronomical observing facilities, theoretical know-how, well-equipped laboratories, an excellent library, data centre and high quality computing facilities to researchers from Indian Universities.

IUCAA is playing a crucial role in introducing the Astronomy & Astrophysics (A&A) curriculum in Indian Universities. Through its Associateship programme, IUCAA has been supporting both A&A research at the highest level in Indian Universities as well as the creation of a pool of skilled human resources for the benefit of the nation. IUCAA has also been involved in training the research scholars and young bachelors and masters students from University and college community by regularly organizing workshops / schools that include both theory and hands-on experiments using sophisticated research facilities. Various focussed training programmes conducted by IUCAA have been playing a crucial role in creating a large user pool of skilled researchers for various national facilities such as GMRT, AstroSat, etc. IUCAA, through collaborations with various research institutions in the country and abroad, is involved in all the three astronomy mega-science programmes (i.e Thirty Metre Telescope, TMT; Square Kilometre Array, SKA; and Laser Interferometer Gravitational-Wave Observatory (LIGO)-India) and ISRO's space programmes such as AstroSat and ADITYA-L1.

Over the past three decades, IUCAA has assumed academic leadership in A&A, while catering to a large and diverse community of University-based researchers and has excelled in multiple niche domains of pure and applied multidisciplinary/interdisciplinary sciences. The broad demesnes of expertise include, Theoretical Physics, Astronomy & Astrophysics, Gravitation and Cosmology, Astronomical Instrumentation, high performance computing and other areas of contemporary interest. The sustained accomplishments of IUCAA in research and allied endeavors through the past decades have elicited a distinguished identity for its practices, both nationally and globally. The associated efforts have significantly contributed to the growth of Science and Technology (S&T) in the country, through the state-of-the-art facilities established in the process and results of scientific excellence obtained therefrom. Further to the scientific merits of their research efforts, IUCAA has continually produced exceptionally skilled human resources, in the service of the nation.

The ever-expanding horizons of the research propositions and practices in A&A undertaken by the teaching faculty of the country bears testimony to the efforts of IUCAA in upholding its mandate. In addition to developing and sustaining a research framework for the teaching fraternity, IUCAA has expanded its footprints in the domains of conventional teaching, through the help extended to Universities in need of support for the laboratory intensive courses as well as for adopting to the new and emerging curriculum.

IUCAA has a vibrant Ph.D. programme which attracts the very best of the research scholars pan India with a combined strength of about 50 scholars at a given time. It also has a postdoctoral fellowship programme with a strength of about 25 scholars at a given time. Recently IUCAA has started a two year M.Sc. programme on Physics with Astrophysics jointly with Savitribai Phule Pune University (SPPU) with a student strength of about 15 per year. At present, IUCAA has not been conferred with the authority to award the Doctoral degrees, and the same are currently being awarded by Jawaharlal Nehru University (JNU).

Thus, IUCAA has been successful in nurturing the bridge between academics and research which, in turn, has uniquely benefited all the stakeholders, the research scholars in particular. In the backdrop of the evolving academic landscape in the country, initiated through the advent of the National Education Policy 2020 (NEP 2020) and the requirement to create a large pool of trained human resources to extract the best science from the mega-science projects, it is natural that the academic mandate of IUCAA should be expanded to include a more comprehensive and cognitive role that will, for instance, provide it with the authority to accord degrees and develop curriculum in the emerging fields. At the same time, IUCAA has a responsibility to progressively link all the stakeholders and create opportunities for new research domains culminating in the development of technology and a multidisciplinary ecosystem. This demands preservation of individual freedom (autonomy) owing to

the specific mandates and operational parameters such as Memorandum Of Understanding (MOU) by IUCAA with other supporting Institutes / Departments. Thus these invariants which are central to the launch, existence and growth of IUCAA need to be firewalled.

The authority to grant degrees and, more importantly, frame the curriculum for new academic programmes at postgraduate and Ph.D. levels will be particularly important in this new academic landscape. By establishing the efficacy of the new programmes as implemented by the DTBU in its first few years, IUCAA will be in a unique position, through its natural connection to the University sector, to use these programmes as templates for A&A education and spread them to Universities across the country over the next decade. Existing frameworks for Teaching-Learning and platforms such as Swayam will play an important part in this endeavour. The formation of a DTBU will thus enable the mandate of IUCAA to be enhanced to the next level in national participation. In order to maximise the potential of the new DTBU in achieving these goals, it is also proposed that Central University rules for hiring, promotion and retirement may be applicable to IUCAA upon the formation of the DTBU.

This Detailed Project Report (DPR) outlines the possibility, wherein IUCAA, as a part of its expansion activity, aims to be recognised as a Deemed-To-Be-University (DTBU), while retaining its present structure along with administrative and scientific activities. The concept of a DTBU emerging from the expansion of IUCAA's teaching activities, will be unique and would enable IUCAA to mark its own footprints in Indian Academia while continuing its support to the Indian University eco-system in pursuing high-quality scientific research.

## **STRATEGIC VISION PLAN:**

In keeping with the demands of the contemporary academic ecosystem, IUCAA has to adopt and adapt to the same, so as to successfully comply with its mandated tasks. Further, the academic ecosystem is getting geared for a major change in view of:

- The proposed implementation of the National Education Policy 2020 (NEP 2020)
- The expanding systematic participation by the Indian Academia in the Mega-Science programmes of national as well as international stature (Thirty-meter telescope (TMT); Square Kilometre Array (SKA); Laser Interferometer Gravitational-Wave Observatory (LIGO)-India, Proposed Underground Facility for Nuclear Astrophysics, Upcoming space observatory missions of ISRO, National Supercomputing Mission, to name a few)
- Sustaining participation from Indian Academia in the emerging R&D sector such as the National Quantum Mission.

The NEP 2020 recommends a holistic approach to a multidisciplinary education established through imaginative open and flexible curricular structure, which can be realized only through credit-based courses and projects in a wide range of subjects. As emphasized by the NEP 2020, “the best teaching and learning processes at the higher education level occur in environments where there is also a strong culture of research and knowledge creation; conversely, much of the very best research in the world has occurred in multidisciplinary university settings”. Thus, NEP 2020 allows setting up specialized degree courses (through a well-defined set of academic banks of credit) that shall cater to providing highly skilled resources for carrying out cutting edge research. The role of IUCAA is amplified in such a framework which is not limited by the conventional boundaries between formal education and research in the country. IUCAA is uniquely placed to offer to the student community a postulated sequence of learning based on academic programmes, with high quality of extant teaching, research, and community engagement.

In particular, IUCAA is poised to play a central role in generating trained human resources from Indian Universities, as potential developers and users of the proposed mega-science facilities, thus creating a large user pool to exploit the benefits from such large collaborative endeavours. The majority of projected users and beneficiaries will be from Indian Universities and IUCAA has a mandate to enable and sustain active participation of researchers from Indian Universities in these mega-science projects through various training programmes.

While academic members of IUCAA are engaged in formal teaching in various Universities, IUCAA in its early stages could not initiate degree awarding programs, due to limited human resources. Recently IUCAA has successfully initiated an ongoing M.Sc programme with SPPU. In order to have more flexibility, it is proposed that the academic expansion of IUCAA includes the possibility to have a degree granting structure.

The proposed structure as detailed subsequently, envisages IUCAA, in addition to continuing its mandated tasks and conducting Ph.D. programmes, as providing specialized M.Sc. programmes in line with its proven expertise and research profile. In addition to the basic courses, IUCAA will offer specialized modular courses (with appropriate credits) that can be taken by students in this setup as well as in other Universities.

To accomplish the above-mentioned goals (namely continuing to perform the core mandate of IUCAA and participating in resource creation activities through teaching endeavors) it is important that the proposed DTBU is formed as an extended part of IUCAA. This would preserve the identity and autonomy of IUCAA. In this document, we propose such a structure with details of the initial set of

courses that IUCAA can offer. As directed by UGC, the Affidavit and NoC have been furnished by the Director, IUCAA.

### **ACADEMIC PLAN:**

It is envisaged that the proposed DTBU will award the degrees for a number of M.Sc. and Ph.D. programmes. The initial proposed set of programmes that will be offered immediately are:

- **M.Sc. (Physics with Astrophysics)**
- **Integrated M.Sc.-Ph.D. (Physics with Astrophysics)**
- **Ph.D. (Physics with Astrophysics)**

Two additional programmes are proposed to be offered within 2 years of inception of the proposed DTBU, namely:

- **M.Sc. (Physics with Computational Astrophysics)**
- **Ph.D. (Physics with Gravitational Science)**

Additionally, the following programmes may be considered within 4 years of inception of the proposed DTBU:

- **M.Sc. (Physics with Instrumentation)**
- **Integrated M.Sc.-Ph.D. (Physics with Instrumentation)**
- **Ph.D. (Physics with Instrumentation)**

The above-mentioned degree courses would be conducted at IUCAA (details of the 5 courses to be offered initially or within 2 years of inception of the DTBU are provided in the Annexure on Course Structure). A proposed roadmap for implementation of these programmes is provided below.

IUCAA would integrate the additional academic activities with the existing activities. These activities will be holistic, covering Post Graduate (Master's Degree) as well as Doctoral (Ph.D. Degree) degree programmes in a wide range of emerging / niche multidisciplinary areas of Science and Technology, with emphasis on innovative research. IUCAA is committed to addressing national needs and societal problems through multidisciplinary research, with the key long-term deliverables being the balanced and sustained growth of the country and its economic development, capacity building of the human resources both in the teaching as well as the R&D sectors, to name a few.

Under the proposed DTBU structure, IUCAA will:

- Strengthen the ongoing (existing) degree programmes,
- Launch new degree programmes based on the expected exclusivity that will emerge from the needs of various mega-science programmes.

The proposed academic programmes are expected to increase the employability of graduates, and serve as a bridge between academia and industry. Blended learning with advanced hands-on-experience based on a solid foundation of the traditional (core) domain basics, which can effectively be provided by the expertise available at IUCAA, is expected to address the less treaded advanced areas and resource crunch experienced when a similar curriculum is being conducted by a conventional teaching institute. The shift in the career landscape, which by and large still demands the intersection of a strong competence in the core subjects and their applications, based on contemporary technical know-how demands, requires that the aforementioned programmes be initiated by establishing the following Departments:

1. Department of Astrophysics
2. Department of Gravitational Science

The **Department of Astrophysics** will host the M.Sc., Integrated M.Sc.-Ph.D. and Ph.D. (Physics with Astrophysics) programmes. The **Department of Gravitational Science** will host the Ph.D. (Physics with Gravitational Science). The course on M.Sc. (Physics with Computational Astrophysics) will be hosted jointly by the two Departments as an interdisciplinary endeavour.

The objective of the courses would be to utilize the expertise and advanced instrumentation and computing facilities available at IUCAA, which are not easily accessible to regular University students, and to provide an ambience that nurtures human resource, which is well trained in experimental techniques in these conventional areas with an equally robust background in the central topics in Physics. The proposed model can be adapted by other Universities while expanding or updating their curriculum.

### **Department of Astrophysics**

The Department of Astrophysics will offer the two-year **M.Sc. (Physics with Astrophysics)**, with a purpose to generate human resources specialized to work on large Astronomy/Astrophysics projects such as LIGO-India, TMT, SKA, space-based astronomy missions etc., within the country or in international collaborations abroad. This M.Sc. programme will provide the requisite training in Physics and Astrophysics through courses on theoretical physics and astrophysics, along with experimental, observational and computational work on current research topics.

This Department will also offer a dual M.Sc.-Ph.D. degree in Physics, namely **Integrated M.Sc.-Ph.D. (Physics with Astrophysics)**, primarily intended towards a research-oriented career. The first two semesters will comprise core and elective courses. Advanced topics and a project in the proposed research domain will be undertaken in the third and fourth semesters. The student would then continue with the Doctoral research from the fifth semester onwards. On successful completion of the programme, the candidate will be awarded both the M.Sc. and Ph.D. degrees.

The department will also offer a **Ph.D. (Physics with Astrophysics)** programme including one year of course work followed by Doctoral research.

Finally, in collaboration with the Department of Gravitational Science, the Department of Astrophysics will jointly offer a two-year **M.Sc. (Physics with Computational Astrophysics)** focusing on interdisciplinary computational topics.

### **Department of Gravitational Science**

The Department of Gravitational Science will primarily offer a **Ph.D. (Physics with Gravitational Science)** programme, with the aim of generating human resources specialized towards the LIGO-India mega-project. The focus of this programme would be to nurture specific skills and talent in theoretical, computational and experimental domains of the physics of gravitation, which will be crucial for not only developing the experimental expertise needed for successfully establishing the LIGO-India project but also maximising the scientific returns from this mega-project, in addition to developing cutting-edge research expertise in this field.

In collaboration with the Department of Astrophysics, the Department of Gravitational Science will also jointly offer a two-year **M.Sc. (Physics with Computational Astrophysics)** focusing on interdisciplinary computational topics.

## **Proposed Roadmap**

The three programmes proposed under the Department of Astrophysics, namely, M.Sc. (Physics with Astrophysics), Integrated M.Sc.-Ph.D. (Physics with Astrophysics) and Ph.D. (Physics with Astrophysics) will be offered from the inception of the proposed DTBU. These would be the natural successors of the Ph.D. and M.Sc. programmes already being offered by IUCAA.

Within 2 years of the inception of the proposed DTBU, the Department of Gravitational Science will offer the Ph.D. (Physics with Gravitational Science). This will require the installation of new experimental setups specific to this programme. Over the same period, the Department of Astrophysics and Department of Gravitational Science will jointly offer the M.Sc. (Physics with Computational Astrophysics).

Within 4 years of inception of the proposed DTBU, it is envisaged that the two Departments will undertake further collaboration and expand into the area of Instrumentation by jointly offering the additional three programmes, namely, M.Sc. (Physics with Instrumentation), Integrated M.Sc.-Ph.D. (Physics with Instrumentation) and Ph.D. (Physics with Instrumentation). This will require establishing new laboratories and experiments, for which a detailed proposal would be submitted to the UGC in due course.

By establishing the efficacy of the new programmes as implemented by the DTBU in its first few years, IUCAA will be in a unique position, through its natural connection to the University sector, to use these programmes as templates for A&A education and spread them to Universities across the country over the next decade. Existing frameworks for Teaching-Learning and platforms such as Swayam will play an important part in this endeavour. IUCAA will also continue its practice of offering various courses under its Ph.D. programme, either as a whole or as individual modules, to research scholars from other Universities. Under the proposed DTBU, the same practice will be extended to the Post-Graduate programmes as well.

## RECRUITMENT PLAN:

The faculty members from IUCAA will carry out the teaching responsibilities. To cope up with the additional teaching/laboratory work IUCAA will require a few additional posts and financial support to establish specific laboratories, which would be requested by IUCAA to UGC.

Considering the involvement in both the mandated tasks as well as the significant contribution in the proposed DTBU, it would be rational to extend the tenure of such staff so as to be commensurate with a similar structure as is prevailing in the Central Universities.

### Administrative Stream:

The proposed administrative structure is as follows:

<b>Officers of the University</b>	
Visitor	
Chancellor	Chairperson of the UGC.
Vice Chancellor	Director of IUCAA.
Pro-Vice Chancellor	None
Registrar	*
Controller of Examinations	None
Deputy Registrar (to be upgraded as a Joint Registrar after 5 years of continuous service as a Deputy Registrar)	None
Finance Officer	Administrative Officer(AO)-Finance of IUCAA
Assistant Registrar	Present coordinator core academic programmes of IUCAA
Dean	Dean – Core academic programmes of IUCAA Dean – Visitor academic programmes of IUCAA
Head of Department	Head Department of Astrophysics Head Department of Gravitational Science
*New posts: As per the model RR of Central University, through a direct recruitment.	

Till the new posts mentioned in the table are created, senior faculty members will be identified to provide the necessary administrative support. The senior administration will be supported by administrative & technical staff (new posts) as per the prevailing norms within the purview of a Central University

## **Academic Stream:**

### **Core Faculty from IUCAA**

The core faculty in the University will be from the existing scientists/faculty members from IUCAA. The institute will recommend the name of the scientist/faculty member to the Executive Council of the DTBU. The maximum number of research scholars that a particular faculty member will be able to guide will be governed by the prevailing UGC norms / regulations.

In addition to the permanent scientists/faculty member of IUCAA, in view of the structured teaching responsibilities, it is essential that the following two categories be considered as a part of the academic stream:

### **Teaching Associateship Programme of IUCAA**

It is proposed to expand the existing Associates programme of IUCAA to include Teaching Associates from Universities. The programme will allow contractual appointment of superannuated academicians from IUCAA and other teaching/research institutes as per UGC norms, as Teaching Associates to take up teaching activities of the DTBU. These positions will be entirely contractual in nature with no administrative responsibilities. The financial compensation for such activities will be fixed in such a manner that the total emoluments does not exceed the last pay drawn by the academicians at the time of their retirement.

### **Professor of Practice**

There will be an option of appointing Professors of Practice as per existing UGC guidelines, in the areas covered by IUCAA. They may also include experts from Industry as per norms.

Some of the existing Technical Officers/ Junior Engineers/ Engineers at senior level can also be nominated to engage in teaching as per existing practice.

## **STUDENT ADMISSION:**

The proposed Departments of the DTBU will offer both Post-Graduate as well as Doctoral programmes. The Post-Graduate programmes will cover the conventional Master's Program. The tenure of the programme leading to a Master's Degree would be 2 years, while the Doctoral programme leading to a Ph.D. degree would be for 5 years. The Integrated M.Sc.-Ph.D. dual program would be for a duration of 7 years.

Admissions to all the Post-Graduate programmes will be through an all-India written entrance test conducted by IUCAA, namely the IUCAA National Admission Test (INAT). The admission process would be held annually.

The initial intake for the individual Master's programmes would be 10 each. In addition, the Department of Astrophysics will initially start with 5 students for the Integrated M.Sc.-Ph.D. in Physics with Astrophysics. The student intake would be reviewed by the Board of Studies and upgraded accordingly.

On successful completion of the Master's Program, the degree would be awarded by the DTBU in accordance with the norms/ regulations prevalent in Central Universities across the country.

Admissions to the Ph.D. programmes would typically be conducted in two sessions, and the eligibility criteria would be governed by the rules / regulations / procedures / norms based on the guidelines from the University Grants Commission. Ph.D programmes will be offered in the subject areas as mentioned earlier. Information will be made available through advertisements brought out periodically

via electronic / print media. Typically, 4-year-B.Sc / Master's students qualified in CSIR-UGC NET / GATE / JEST/ DST INSPIRE or equivalent national entrance examinations are eligible to apply for the programmes. IUCAA will continue its practice of selecting Ph.D. candidates through a rigorous process involving screening of applications, shortlisting based on the eligibility criteria, national level entrance tests (INAT and JEST), and interaction with an interview committee, following UGC guidelines. The number of Ph.D. candidates clearing this selection and joining IUCAA has typically been about 8-9 per year, and this number is expected to increase to about 16-18 under the programmes to be offered by the proposed DTBU. The students who register for the Ph.D. programme have to go through the prescribed mandatory pre-Ph.D. course work. The duly constituted Research Advisory Committee will approve the research proposal and meet once every semester to evaluate the progress made by the student. On submission of the thesis, the DTBU will conduct the viva voce as per the norms, and the degree will be awarded by the DTBU after successful defense of the thesis.

### **RESEARCH PLAN:**

The main objectives of Inter-University Centre for Astronomy and Astrophysics are to provide a centre of excellence within the University sector for teaching, research and development in Astronomy & Astrophysics, as well as to promote nucleation and growth of active groups in this area in the Universities. The aim is to provide researchers from University departments access to state-of-the art astronomical instrumentation, theoretical know-how, well-equipped laboratories, data centres and high-quality computing facilities.

Members of IUCAA are actively engaged in research in all areas of Astronomy and Astrophysics including Instrumentation, Multi-Wavelength Ground and Space-Based Observations and Data Analysis, Quantum Metrology and Precision Measurements, Solar Physics, Extragalactic Astronomy, High-Energy Astrophysics, Gravitational Wave Astrophysics, Theoretical and Computational Astrophysics, Large-Scale Structure, Gravitation and Cosmology.

IUCAA is a participant in major national and international projects such as the currently operating 10-m Southern African Large Telescope (SALT), the multi-wavelength AstroSat mission, Aditya-L1 mission; the next generation optical observatory - the Thirty Meter Telescope (TMT); the planned advanced gravitational-wave observatory - the LIGO-India; the Vera Rubin Observatory (Rubin LSST); the Square Kilometre Array (SKA); the National Quantum Mission (NQM). IUCAA has a high-performance computational facility and an excellent library.

Major projected users and beneficiaries of these facilities are expected to be from Indian universities and IUCAA is mandated to enable and sustain active participation of researchers from Indian universities in these mega-science projects through various training programmes.

### **CAMPUS INFORMATION & COMMUNICATION TECHNOLOGY PLAN:**

The administrative office of the DTBU will be housed in IUCAA's campus. All the Academic activities will always be at IUCAA.

### **FINANCE PLAN:**

IUCAA is fully funded by the Ministry of Education through UGC. A letter of commitment from the nodal ministry to continue financial support to IUCAA even after declaration as a DTBU shall be duly furnished by UGC.

To initiate and sustain the academic programmes, the present budget for IUCAA will have to be augmented. IUCAA will duly submit the requirements. The budget for the administrative work at the DTBU will be allocated separately by the UGC.

### **ADMINISTRATIVE PLAN:**

The following shall be the Authorities of the DTBU:

Executive Council	The existing Governing Board of IUCAA will additionally carry out the responsibility of the Executive Council of the DTBU.
Academic Council	The principal academic body of the DTBU to co-ordinate and exercise general supervision over the academic policies of the DTBU. The constitution of the academic council will be in accordance with the UGC guidelines.
Board of Studies	Supervise and coordinate the academic curriculum of the DTBU. The constitution of the board of studies will be in accordance with the UGC guidelines.
Finance Committee	To co-ordinate and exercise general supervision over the financial policies and to ensure compliance of all the statutory and financial practices. The existing Finance Committee of IUCAA will additionally carry out the responsibilities of the Finance Committee of the DTBU.

### **INFRASTRUCTURE DEVELOPMENT PLAN:**

IUCAA is fully equipped with classrooms, cafeteria, playgrounds, transit accommodation, common room for the students, library infrastructure, etc. IUCAA is already equipped with Astrophysics laboratories that are regularly being used for the 2nd year SPPU-IUCAA M.Sc. (Physics with Astrophysics) students. Basic physics laboratories are planned to be created within the existing infrastructure available at IUCAA. For student accommodation, arrangements in the immediate vicinity shall be made on rental basis as and when required till permanent hostels are built by IUCAA with the financial support from the UGC. IUCAA will also request UGC for funds to set up specialised labs for the advanced courses.

## **GOVERNANCE**

IUCAA (DTBU) shall be registered as a not-for profit society under the Societies Registration Act, 1860 (21 of 1860) or as a not-for-profit trust under the Indian Trusts Act, 1882 (2 of 1882) or as a not-for-profit company registered under section 8 of the Companies Act, 2013 (18 of 2013).

All moveable and immovable assets of IUCAA(DTBU) shall be used for the purposes of conducting academic activities, promotion of research and related administrative requirements of the institution deemed to be University, along with creation, operation and maintenance of astronomical facilities as per IUCAAs original mandate including the outreach and educational activities.

### **The Council of the centre:**

- 1) The Council shall be a body consisting of the members of the Governing Board, with Director of the Centre as Member- Secretary. The President of the Council shall be the Chairperson of the University Grants Commission, and the Vice-President shall be the Vice-Chairperson of the UGC. The other members of the Council shall be four Vice-Chancellors, four Scientists from the Universities, Secretary, Department of Space, Director General of the CSIR and Secretary, Department of Science and Technology. The members other than members of the Governing Board or the ex-officio members, will be nominated by the Chairperson of the UGC. The nominated members will have a term of two years. Nominees of the members are not permitted to attend the council meeting.
- 2) The Chairperson of the Governing Board shall be an eminent scientist, in the areas of relevance to the Centre, nominated by the President of the Council. The President shall constitute a Search Committee consisting of three eminent scientists which will submit a panel of three names. The President shall make the nominations of the Chairperson of the Governing Board from the names submitted by the Search Committee. Besides the experts in the concerned field, the Search Committee may consult the Centre and the Vice- Chancellors. The tenure of the Chairperson shall normally be three years which may further be extended by another term of three years.
- 3) The Director appointed by the President of the Council, as per the procedure given in the rule 21 (b), shall be the Member Secretary of the Council.
- 4) The Council shall hold an Annual meeting in such time, date and place as may be determined by the President to consider the Annual Report of the Centre, and the Audited Statement of Accounts together with the Auditor's Report thereon.
- 5) The President may convene a special meeting of the Council as he/she thinks fit or direct the Secretary to call a meeting.
- 6) On the requisition of at least four members, the President shall convene a Requisition Meeting of the Council.
- 7) At such Requisitioned Meeting no matter other than that stated in the notice of the meeting shall be discussed.
- 8) The President or the Secretary of the Council shall issue notices of all meetings of the Society to members of the Council giving 10 clear days before the appointed date for such meeting. The notice will specify the time and place of the meeting and can be served personally or by post.
- 9) The accidental omission to give notice or non-receipt of notice by any members shall, not invalidate the proceedings at the meetings.

- 10) The President of the Council shall preside at all meetings of the Council. In his/her absence, the Vice-President shall preside, or in the absence of both, Council members present shall elect one amongst themselves to act as the protem Chairperson at the meeting.
- 11) One-third of the members of the Council shall form a quorum at any meeting of the Council. If there is no quorum at any meeting, it shall stand adjourned and members shall meet after half an hour. At an adjourned meeting no quorum shall be necessary. However, at such adjourned meeting no other business, except that mentioned in its agenda, shall be transacted.
- 12) Each member of the Council shall have one vote. In case of equality of votes, the President shall have a casting vote.
- 13) All matters voted on shall be determined by a majority of votes of the members present and voting.

The highest governing body of the DTBU shall be the Executive Council. The present “Governing board” of the centre will play the additional role of the Executive Council of IUCAA (DTBU). Below we use the terms “Executive Council” with this understanding.

The Executive Council of IUCAA (DTBU) (Governing Board of the centre) shall be the principal executive body of the institution deemed to be University

The composition of the Executive council of IUCAA (DTBU) is as follows:

- 1) **Chairperson:** Be appointed by the president of the IUCAA’s Council, as per the procedure given above (i.e (7)(ii)).
- 2) **Ex-officio Members (five):** Vice Chancellor, SPPU, Pune; Director, National Centre for Radio Astrophysics, Pune and Secretary, UGC and Two Deans of the Centre.
- 3) **Member-secretary:** Director, IUCAA (i.e Vice Chancellor of IUCAA (DTBU))
- 4) Three Vice Chancellors or Directors of Institutes of higher learning to be nominated by the chairperson, UGC.
- 5) Three eminent scientists to be nominated by the Chairperson, UGC of which one will be from the commission and one from the centre.
- 6) One scientist will be nominated by the government of India.
- 7) The Registrar (as and when appointed) shall be made part of the executive council.

### **Tenure of the members of the Executive Council:**

Each nominated member of the Executive Council shall be deemed to have relinquished his/her membership on the expiry of three years from the date on which he/she is nominated as member of the Executive Council unless his/her membership of the Executive Council is terminated by the nominating authority earlier. In case of a casual vacancy, the person appointed to fill the vacancy, shall hold office for the unexpired portion of the term of the outgoing member.

Whenever a person holds the membership of the Executive Council by virtue of an office held by him/her (ex-officio) his/her membership shall terminate when he/she ceases to hold that office and the vacancy so caused shall be filled by his/her successor to that office.

The members of the Executive Council shall not be entitled to any remuneration from IUCAA except the full-time director of IUCAA. The non-official members of the Executive Council or any committee appointed by it, shall be paid by the Centre, such travelling and daily allowances and honorarium as may be provided for in the bye-laws of IUCAA (DTBU).

A person holding the membership of the Executive Council shall attend the Executive Council meeting himself/herself in person.

**Powers and Limitations of the Executive Council of IUCAA (DTBU) (Governing Board of the centre):**

The Executive Council of IUCAA (DTBU) shall have the power of management and administration of the DTBU.

Subject to the provisions of these Regulations and Rules of the IUCAA (DTBU), the Executive Council of IUCAA (DTBU) (Governing Board of the Centre) shall, in addition to all other powers vested in it, have the following powers to:

- 1) manage, administer and review the affairs of the IUCAA (DTBU) and to conduct all administrative affairs of the IUCAA (DTBU) not otherwise provided for.
- 2) Consider the annual and supplementary budgets placed before it from time to time, and pass them with such modifications as the Executive Council of IUCAA (DTBU) (Governing Board of the centre) may think fit and forward them to the University Grants Commission for approval.
- 3) Create and abolish posts, and decide on the emolument structure of various posts, i.e. adoption of pay scales, allowances and revision thereof and creation of posts above a specified pay scale, all subject to the approval of the University Grants Commission.
- 4) Adopt recruitment rules, promotion policies and service conditions for academic, scientific and administrative staff implemented in central universities as deemed appropriate, subject to the approval of the commission.
- 5) Appoint various scientific, technical, administrative and other officers and staff of the Centre for those posts for which the Executive council of IUCAA (DTBU) (Governing Board of the centre) is the appointing authority, to fix their remuneration, terms and conditions of service, to enforce discipline and to impose penalty in accordance with the rules and the bye-laws: if action is to be taken in an emergency the Director can take necessary action and subsequently report to the Executive Council of IUCAA (DTBU) (Governing Board of the centre).
- 6) Enter into arrangements with the Government of India and with the State Governments and other public and private organisations or individuals within the country for securing and accepting grant-in-aid, endowments, donations or gifts to the Centre (IUCAA (DTBU)), on mutually agreed terms and conditions, provided that such terms and conditions, if any, shall not be contrary to, inconsistent or in conflict with the objects of the Centre (IUCAA (DTBU)), provided, for any such agreement with foreign and/or international agencies or organisations the prior approval of the Government of India through the University Grants Commission shall be obtained.
- 7) Take over, acquire by purchase, gifts, exchange, lease or hire or otherwise from Government of India, the State Governments and other public or private bodies or individuals, institutions, libraries, laboratories, immovable properties, endowments or other funds together with any attendant obligations and the engagements not inconsistent with the objects of the Centre (IUCAA (DTBU)), provided for any such activity involving foreign and/or international agency or organisation, the prior approval of the Government of India through the University Grants Commission shall be obtained.
- 8) Discuss, negotiate and sign, MoUs, agreements, contracts or otherwise with Government of India, the state Governments and other public or private bodies or individuals, institutions,

libraries, laboratories, not inconsistent with the objectives of the centre (IUCAA (DTBU)), provided for any such activity involving foreign and/or international agency or organisation, the prior approval of the Government of India through the University Grants Commission shall be obtained.

- 9) Entertain, adjudicate upon or redress grievances of the employees of the Centre (IUCAA (DTBU)) who may feel aggrieved.
- 10) Delegate such administrative and financial power as it may think proper to the Director of the Centre (Vice Chancellor of IUCAA (DTBU)) and such other officers of the Centre (IUCAA (DTBU)) as may be considered necessary; and to frame, amend or repeal Bye-laws, for the administration and management of the following matters:
  - a) Preparation and sanction of budget estimates, sanctioning of expenditure, entering into the execution of contracts, investment of the funds of the Centre (IUCAA (DTBU)), sale or alteration of such investments and maintenance of accounts and their audit.
  - b) Procedure for recruitment of officers, scientists and establishment in the service of the Centre (IUCAA (DTBU)).
  - c) Terms and tenures of appointments, emoluments, allowances, rules of discipline and other conditions of the establishment of the Centre (IUCAA (DTBU)).
  - d) Terms and conditions governing the grant of scholarships, fellowships and grant-in-aid for research schemes and projects not inconsistent with the objects of the Centre (IUCAA (DTBU)).
  - e) Such other matters as may be necessary for the administration of the affairs and funds of the Centre (IUCAA (DTBU)).
- 11) To recognize Scientists/Faculty from the centre (IUCAA (DTBU)) as eligible teaching faculty and/or Ph.D./Masters guides based on the recommendations of the Academic Council.
- 12) To regulate and enforce discipline among teaching staff in accordance with the Rules
- 13) To provide for the appointment of Visiting Professors, Emeritus Professors, Professor of Practice, Consultants (on-contract positions), etc. and determine the terms and conditions of such appointments, based on the recommendations of the Academic Council of IUCAA (DTBU).
- 14) To exercise such other powers and perform such other duties as may be conferred or imposed on it by these Regulations and Rules of the IUCAA (DTBU).
- 15) The Executive council of IUCAA (DTBU) (Governing Board of the Centre) will appoint the following committees as per procedure provided in the rules: 1. Finance committee, 2. Scientific Advisory committee, 3. Users committee and 4. Academic council of IUCAA (DTBU).

### **Meetings of the Executive Council of IUCAA (DTBU) (Governing Board of the Centre):**

- 1) The Executive Council shall meet at least twice a year (minimum once in a semester), with not less than 7 days of notice given before every meeting of the Executive Council. Emergency meetings can be convened by giving short notice of 2 days (with option of joining on-line).
- 2) Attendance by more than one-third of the total number of members of the Executive Council shall form the quorum for a meeting. If there is no quorum at any meeting it shall stand adjourned and members shall meet after half an hour. At an adjourned meeting, no quorum

shall be necessary. However, at such an adjourned meeting, no other business, except that mentioned in its agenda, shall be transacted.

- 3) In the absence of the Chairperson, the members present shall elect one of themselves to act as pro-temporary Chairperson of the meeting.
- 4) Every member of the Executive Council, including its Chairperson, shall have one vote and decisions at the meetings of the Executive Council shall be taken by simple majority; and in case of a tie, the Chairperson shall have a casting vote.
- 5) Any business, which may be urgent in nature, may be carried out by circulation amongst its members.
- 6) In the case of a difference of opinion amongst the members of the Executive Council of IUCAA (DTBU) (Governing Board of the Centre) on a question of sufficient importance, the opinion of the majority shall prevail. The ruling of the Chairperson in regard to all questions of procedure shall be final.
- 7) A copy of the minutes of each meeting shall be furnished to the Chancellor/Director of the centre (Vice Chancellor of IUCAA (DTBU)) as soon as possible after the meeting.

A committee of senior academic members (including the director (Vice Chancellor) and Deans of the centre (IUCAA (DTBU))) will be formed to discuss any important issues requiring urgent attention to advise the Executive council.

## **Other authorities of DTBU**

### **Academic Council:**

The Academic Council shall be the principal academic body of IUCAA (DTBU) and shall, subject to the provision of the Rules of IUCAA (DTBU), co-ordinate and exercise general supervision over the academic policy of the IUCAA (DTBU).

The composition of the Academic Council shall be as follows:

- 1) Vice Chancellor of IUCAA (DTBU) (Director of the Centre) - Chairperson.
- 2) Deans of IUCAA.
- 3) Each Head of Department.
- 4) One Professor or Scientist of equivalent grade (excluding Deans & Head of Departments) on the basis of seniority and rotation to be nominated by the centre director giving due regard to representation of different Departments.
- 5) One Associate Professor or Scientist of equivalent grade from IUCAA (DTBU) other than the Head of the Departments, by rotation according to seniority to be appointed by the centre director.
- 6) One Assistant Professor or Scientist of equivalent grade from IUCAA (DTBU) other than the Head of the Departments, by rotation according to seniority to be appointed by the centre director.
- 7) Four persons of repute from amongst educationists or experts for their specialized knowledge, who are not in the service of the IUCAA (DTBU), nominated by the centre director.
- 8) The Registrar, shall be the ex-officio Secretary of the Academic Council.

Note : The representation of different categories shall be only through rotation and not through an election. The term of members, other than the ex-officio members, shall be three years.

### **Powers and Functions of the Academic Council:**

Subject to the provisions of these Regulations and Rules of the IUCAA (DTBU), the Academic Council shall, in addition to all other powers vested in it, have the following powers:

- 1) To exercise general supervision over the academic policies of IUCAA (DTBU) and to give direction regarding methods of instruction, coordination of teaching among the Departments, evaluation of research and improvement of academic standards.
- 2) To bring about and promote inter-departmental, inter-faculty, coordination and to establish or appoint such committees or boards as may be deemed necessary for the purpose.
- 3) To consider matters of general academic interest either on its own initiative, or on a reference by a Department/Faculty or the Executive Council, and to take appropriate action thereon.
- 4) To prescribe courses /programmes of study leading to the degree of the DTBU.
- 5) To make arrangements for the conduct of examinations in conformity with the Rules/Bye-Laws.
- 6) To maintain proper standards of the examinations.
- 7) To recognize degrees of Universities and other Institutions and to determine equivalence with the degrees of IUCAA (DTBU).
- 8) To institute Fellowships, Scholarships, Medals, Prizes etc.
- 9) To frame rules covering the academic functioning of IUCAA (DTBU), admissions, examinations, award of fellowships and studentships, free-ships, concessions, attendance, discipline, residence etc.
- 10) To take a periodical review of the activities of the departments and to take appropriate action to maintain and improve standards of instruction.
- 11) To recommend the institution of teaching posts (Professors, Associate Professors, and Assistant Professors) to the Executive Council.
- 12) To make recommendations to the Executive Council for the establishment or abolition of departments or centres or schools or faculties, etc.
- 13) To make recommendations to the Executive Council, and
- 14) To exercise such other powers, and to perform such other duties, as may be conferred or imposed upon it by the rules of IUCAA (DTBU).

### **Meeting of the Academic Council:**

The Academic Council shall meet as often as necessary but not less than four times (at least twice in a semester) during an academic year with no less than 7 days of notice being given before every meeting of the Academic Council. Emergency meetings can be convened by giving a short notice.

More than one third of the total number of members of the Academic Council shall constitute the quorum for the meeting of the Academic Council. If there is no quorum at any meeting it shall stand adjourned and members shall meet after half an hour. At an adjourned meeting, no quorum shall be necessary. However, at such adjourned meetings, no other business, except that mentioned in its agenda, shall be transacted.

Each member of the Academic Council, including the Chairperson, shall have one vote and decisions at the meeting shall be taken by simple majority; and in case of a tie, the Chairperson shall have a casting vote.

Any business that may be necessary for the Academic Council to perform, which may be urgent in nature, may be carried out by circulation amongst its members.

### **Finance Committee**

The existing finance committee of the Centre will also act as the Finance Committee of IUCAA (DTBU). The Finance committee shall consist of the following members:

- 1) The Chairperson of the Governing Board of the Centre (Executive Council of IUCAA (DTBU)) as the chairperson of the Finance Committee of IUCAA (DTBU).
- 2) **Ex-officio members:** The Secretary, UGC; The financial Advisor, UGC; Director, IUCAA (Vice Chancellor of IUCAA (DTBU)); The Bureau Head of the Plan Budget Section, UGC.
- 3) One Senior Scientist of the Centre (IUCAA (DTBU)), nominated by the Director of the Centre (Vice Chancellor of IUCAA (DTBU)).
- 4) One member of the Executive Council nominated by the Chairperson, of the Executive Council.
- 5) One external member nominated by the UGC
- 6) Senior administrative officer of the Centre as non-member secretary.

### **Tenure of members of the Finance Committee:**

All members of the Finance Committee other than ex-officio members shall hold office for a term of three years.

The Finance Committee shall meet at least four times a year (at least twice each semester) to examine the accounts and scrutinize proposals for expenditure. More than one-third of the total number of members of the Finance Committee shall form the quorum for a meeting. If there is no quorum at any meeting it shall stand adjourned and members shall meet after half an hour. At an adjourned meeting, no quorum shall be necessary. However, at such adjourned meetings, no other business, except that mentioned in its agenda, shall be transacted.

All proposals relating to creation of posts in IUCAA (DTBU), and those items which have not been included in the Budget, shall be examined by the Finance Committee before the Executive Council considers them and to decide waiver in fees, the establishment of scholarships, freeship and any other financial benefits.

The annual accounts and financial estimates of IUCAA (DTBU) prepared by the Finance Officer shall be placed before the Finance Committee for consideration and comments and thereafter submitted to the Executive Council for approval.

The Finance Committee shall recommend limits for the total recurring and non-recurring expenditures for the year, based on the income and resources of the IUCAA (DTBU).

### **Scientific Advisory Committee (SAC):**

The Scientific Advisory Committee will be appointed by the Governing Board of the Centre (Executive Council of IUCAA (DTBU)). It will consist of eight active and distinguished scientists from within the country and abroad. The Director of the Centre (Vice Chancellor of IUCAA (DTBU)) will be the member secretary and the Chairperson of Governing Board (Chairperson of the Executive Council of IUCAA (DTBU)) will nominate one of the members as Chairperson of the Committee. The term of office of a member will be three years. The prime function of the Committee is to review the research and teaching work being done by the staff of the Centre and its various other programmes. The SAC will submit its report, which will include a review of the Centre's activities and advice on future directions and the developments, to the Governing Board (Executive Council of IUCAA (DTBU)) which will in turn take it to the University Grants Commission.

### **Users' Committee:**

The Users' Committee will consist of the Director (Vice Chancellor of IUCAA (DTBU)) and two senior faculty members of the Centre, three Vice-Chancellors of Universities that have active interaction with the Centre and two Scientists from among those who are users of the Centre. The Director, IUCAA (Vice Chancellor of IUCAA (DTBU)) will be the Chairperson of the Committee. The non ex-officio members will be nominated by the Chairperson of the Governing Board (Chairperson of the Executive Council of IUCAA (DTBU)) from a panel of names prepared by the Director, IUCAA (Vice Chancellor of IUCAA (DTBU)). The term of nominated members shall be three years.

One-third of the members present shall form a quorum at any meeting of the Users' Committee. If there is no quorum at any meeting, it shall stand adjourned and members shall meet after half an hour. At an adjourned meeting, no quorum shall be necessary. However, at such adjourned meeting no other business, except that mentioned in its agenda, shall be transacted. In the absence of the Chairperson, members present shall elect one amongst themselves to act as the protem Chairperson.

The Users' Committee will make recommendations to the Governing Board (Executive Council of IUCAA (DTBU)) for optimal and effective utilisation of the Centre's facilities by visiting university scientists. It may in general comment on the visitor academic programmes such as schools, courses, workshops etc. conducted by the Centre.

The Users' Committee will have the responsibility of devising methods for obtaining feed-back from the users.

### **Board of Studies**

There shall be one Board of Studies for each Department of IUCAA (DTBU). The composition of the Board of Studies shall be as under:

- 1) One of the Deans would assume the responsibility as the Chairperson by rotation on seniority.
- 2) The other Dean would then assume the responsibility as the Vice-Chairpersons.
- 3) All faculty members in the rank of Professor or Scientists of equivalent grade of the Department.
- 4) One Associate Professors or Scientists of equivalent grade of the Department by rotation based on seniority.
- 5) One Assistant Professors or Scientists of equivalent grade of the Department by rotation based on seniority.
- 6) Two external experts to be co-opted for their specialized knowledge.

Subject to the overall control and supervision of the Academic Council, the functions of the Board of Studies shall be to approve subjects for teaching and research for various degrees and other requirements of research degrees and to recommend to the concerned Department in the manner prescribed by the Rules:

- 1) Courses of studies.
- 2) Appointment of supervisors for research.
- 3) Measures for the improvement of the standards of teaching and research.

Note: The powers and functions of the Board of Studies shall be prescribed by the Rules of the IUCAA (DTBU).

### **Selection Committee for Appointment of Teaching Staff**

There shall be one or more Selection Committees constituted, for making recommendations to the Executive Council for appointment to the post of Professors, Associate Professors, Assistant Professors and such other posts as may be prescribed, in accordance with the University Grants Commission (Minimum Qualifications for Appointment of Teachers and other Academic Staff in Universities and Colleges and other Measures for the Maintenance of Standards in Higher Education) Regulations 2018.

### **Disqualification:**

A person shall be disqualified for being chosen as, and for being, a member of any of the authorities, or being appointed as, and for being, an officer, of IUCAA (DTBU) if:

- 1) if he/she is of unsound mind; or
- 2) if he/she is an un-discharged insolvent; or
- 3) if he/she has been convicted by a court of law for an offence involving moral turpitude and sentenced in respect thereof to imprisonment for not less than six months; or
- 4) if he/she has not been appointed as per the provisions of these Regulations.

If any question arises as to whether a person is or had been subjected to any of the disqualifications mentioned above, the question shall be referred to the Chancellor and his/her decision shall be final and no suit or other proceeding shall lie in any civil court against such decision.

### **Miscellaneous matters relating to different authorities**

- 1) If any question arises, as to whether any person, other than Government nominated or appointed, has been duly nominated or appointed as, or is, entitled to be a member of any authority or any committee of the institution deemed to be University, the matter shall be referred to the Chancellor, whose decision thereon shall be final and binding.
- 2) Any member, other than an ex-officio member of any authority, may resign by a letter addressed to the Registrar, and the resignation shall take effect as soon as it is accepted by the Chancellor or the Chairperson of the Executive Council, as the case may be. Until the

appointment of a Registrar, such a resignation letter may be addressed to the Vice-Chancellor of IUCAA (DTBU) (Director of the Centre).

- 3) Sudden vacancies among the members of any authority or any Committee of the institution deemed to be University shall be filled by the respective authority, as soon as may be, and within a period of six months.

## **Officers of institution deemed to be University**

### **Chancellor:**

(1) The Chancellor shall hold office for a period of five years from the date of assuming office and shall be eligible for re-appointment for one more term by following the procedure prescribed for the appointment of the Chancellor:

PROVIDED that the Chancellor in the institutions deemed to be Universities managed or controlled or receiving funds more than or equal to fifty per cent. of their annual receipt from the Central or State Government or its Agencies, shall be appointed by the respective Government.

(2) The Chancellor shall, by virtue of his or her office, be the head of the institution deemed to be University and shall, if present, preside at the Convocations of the institution deemed to be University held for conferring degrees.

(3) In the case of Government controlled or managed or receiving funds more than or equal to fifty per cent. of their annual receipt, the Chancellor shall not be removed from office except by an order of the appropriate Government.

### **Vice-Chancellor:**

The Director, IUCAA shall be ex-officio Vice-Chancellor of the DTBU. Below we use the terms "Vice-Chancellor" with this understanding.

- 1) Vice-Chancellor of IUCAA (DTBU) (The Director of the Centre) will be the executive authority of the Centre (IUCAA (DTBU)) and shall be responsible for proper administration and funds of the Centre. He/She will provide academic leadership to the Centre (IUCAA (DTBU)).
- 2) The Vice-Chancellor (Director of the Centre) will be an eminent scientist appointed by the President of Council on the recommendation of the Search -cum-Selection Committee. The qualifications of the Vice-Chancellor (Director of the Centre) shall be in accordance with the University Grants Commission (Minimum Qualifications for Appointment of Teachers and other Academic Staff in Universities and Colleges and other Measures for the Maintenance of Standards in Higher Education) Regulations, 2018.
- 3) The procedure for composition of Search-cum-Selection-Committee (SCSC) for the selection of Vice Chancellor shall be as under—
  - a) the Vice-Chancellor in the institution deemed to be University managed or controlled or receiving funds more than or equal to fifty per cent of their annual receipt from the Central or State Government or its Agencies shall be appointed by Central Government or the State Government, as the case may be.
  - b) The president of the Council will constitute the Search committee with at least three eminent scientists, out of which one member will be the Chairperson of the Governing board of the Centre (Chair person of Executive Council of IUCAA (DTBU)). The committee shall also meet the faculty members of the Centre and would solicit their views.

- 4) The Vice-Chancellor (the Director of the Centre) shall hold office for a term of five years from the date on which he or she enters upon his or her office or until he or she attains the age of seventy years, whichever is earlier and shall be eligible for re-appointment for one more term by following the procedure prescribed for the appointment of Vice-Chancellor: Provided that notwithstanding the expiry of the said period of five years, he or she shall continue in office until his or her successor is appointed and enters upon his or her office, however, in no case, the Vice-Chancellor shall hold office beyond the age of seventy years: Provided further that the Chancellor may direct the Vice-Chancellor, after his or her term has expired, to continue in office for such period, not exceeding a total period of one year.
- 5) In the case of Government controlled or managed or receiving funds more than or equal to fifty per cent of their annual receipt, the respective Government may direct the Vice-Chancellor, after his or her term has expired, to continue in office for such period, not exceeding a total period of one year.
- 6) If the office of the Vice-Chancellor becomes vacant due to death, resignation or otherwise, or if he or she is unable to perform his or her duties due to ill health or any other cause, the Pro-Vice-Chancellor shall perform the duties of the Vice-Chancellor: Provided that if the Pro-Vice-Chancellor is unavailable, the Chancellor shall appoint the senior most Professor who shall perform the duties of the Vice-Chancellor, until a new Vice-Chancellor assumes office or the existing Vice-Chancellor resumes the duties of his or her office, as the case may be.

Provided further that, in the case of Central Government or State Government controlled or managed or receiving funds more than or equal to fifty per cent of their annual receipt, the Government shall appoint the senior most Professor or any other eminent academician to perform the duties of the Vice-Chancellor initially for a period of six months or until a new Vice Chancellor assumes office or the existing Vice-Chancellor resumes the duties of his or her office, as the case may be.

#### **Powers and duties of Vice-Chancellor:**

The Vice-Chancellor shall be the Principal Executive Officer and academic officer of IUCAA (DTBU) and shall exercise general supervision and control over the affairs of the IUCAA (DTBU) and give effect to the decision of all authorities of IUCAA (DTBU).

The Vice-Chancellor (Director of the Centre) will be vested with such executive powers as may be necessary or incidental for purpose of proper administration of the Centre subject to the rules and Bye-laws.

The Vice-Chancellor (Director of the Centre) shall, subject to provisions of the Rules and Bye-laws and decisions of the Governing Board, exercise general supervision and disciplinary control over the officers and the staff of the Centre (IUCAA (DTBU)) and prescribe their duties and functions.

The Vice-Chancellor (Director of the Centre) shall coordinate and exercise general supervision of all the activities of the Centre (IUCAA (DTBU)).

The Vice-Chancellor may, if he/she is of the opinion that immediate action is necessary on any matter, exercise any power conferred on any authority of IUCAA (DTBU) by or under these Regulations and shall report to such authority at its next meeting the action taken by him/her on such matter. Provided that if the authority mentioned in this sub-regulation is of the opinion that such action ought not to have been taken, it may refer the matter to the Chancellor whose decision thereon shall be final. Provided further that any person in the service of the IUCAA (DTBU) who is aggrieved by the action

taken by the Vice-Chancellor under this sub-section shall have the right to represent against such action to the Executive Council within 90 days from the date on which decision on such action is communicated to him/her and thereupon the Executive Council may confirm, modify or reverse the action taken by the Vice-Chancellor.

The Vice-Chancellor, if he/she is of the opinion that any decision of any authority of IUCAA (DTBU) is beyond the power of the authority conferred by the provisions of these Regulations or that any decision taken is not in the interest of IUCAA (DTBU), may ask the authority concerned to review its decision within sixty days of such decision and if the authority refuses to review the decision either in whole or in part or no decision is taken by it within the said period of sixty days, the matter shall be referred to the Chancellor whose decision thereon shall be final.

The Vice-Chancellor shall be the Ex-officio Chairperson of the Academic Council and shall, in the absence of the Chancellor, preside at the Convocations held for conferring degrees.

The Vice-Chancellor shall be entitled to be present at, and address, any meeting of any authority or other body of IUCAA (DTBU), but shall not be entitled to vote in that meeting, unless he/she is a member of such authority or body.

It shall be the duty of the Vice-Chancellor to see that these Regulations are duly observed and implemented and he/she shall have all the powers necessary to ensure such observance.

The Vice-Chancellor shall have all the powers necessary for the proper maintenance of discipline in the IUCAA (DTBU) and he/she may delegate any such powers to such person or persons as he/she deems fit.

The Vice-Chancellor shall have the power to convene or cause to be convened the meetings of the Executive Council, the Academic Council, and the Finance Committee and other authorities.

The Vice-Chancellor (Director of the Centre) shall act as the Secretary of the Society. For the purpose of Section of the Bombay Societies Regulation Act of 1860, the Secretary shall be considered the Principal Secretary of the Society and the Society may sue or be sued in the name of the Secretary of the Society.

### **Removal of Vice-Chancellor**

(1) Where there are reasons to believe that the Vice-Chancellor of IUCAA (DTBU) does not possess the qualifications as required under the University Grants Commission (Minimum Qualifications for Appointment of Teachers and other Academic Staff in Universities and Colleges and other Measures for the Maintenance of Standards in Higher Education) Regulations, 2018, or is not appointed as per the procedure stipulated in these regulations or has committed any financial or administrative impropriety, the Chairman of Commission shall constitute an enquiry committee consisting of academic, administrative or financial experts to enquire into the matter.

(2) The enquiry committee shall give an opportunity of hearing to the Vice-Chancellor before submitting its report to the Commission and where the report of the enquiry committee confirms the ineligibility or procedural violations or impropriety, as the case may be, the Commission shall direct the Chancellor to remove the Vice Chancellor by following due procedure:

Provided that, in respect of the Vice-Chancellor of IUCAA (DTBU) the central Government shall constitute an enquiry committee which shall provide an opportunity of hearing to the Vice-Chancellor

before submitting its report to the Government and in the interregnum period, the Government shall place the Vice-Chancellor under suspension, pending enquiry and the Vice-Chancellor shall be removed only by the concerned Government.

### **Registrar**

The Registrar shall be a whole-time salaried officer of the IUCAA (DTBU) and shall be appointed by the Executive Council on the recommendations of the Selection Committee consisting of the following:

- 1) Vice Chancellor – Chairperson.
- 2) The deans of IUCAA (DTBU)
- 3) Member nominated by the Chancellor.
- 4) Two members of the Executive Council nominated by the Council.
- 5) One expert not in the service of the IUCAA (DTBU) nominated by the Executive Council

The meeting of the selection committee shall be fixed after prior consultation with, and subject to the convenience of the Chancellor's nominee and the experts nominated by the Executive Council. The proceedings of the Selection Committee shall not be valid unless at least three of the Chancellor's nominees & persons nominated by the Executive Council attend the meeting.

The Registrar shall hold office for a term as per the Central University norms from the date of assuming office, and shall be eligible for reappointment for a second term. Provided further that, in any case, the Registrar shall retire on attaining the age of sixty-two years. The emoluments and other terms and conditions of service of the Registrar shall be as prescribed by the Central University norms.

When the office of the Registrar is vacant or when the Registrar is on leave or absent due to any other reasons, the duties and functions of the Registrar shall be performed by such other person as the Vice-Chancellor may appoint for the purpose.

The Registrar shall be ex-officio Secretary of the Executive Council and the Academic Council, but shall not be Deemed to be a member of any of these authorities.

The Registrar shall be directly reporting to the Vice-Chancellor and work under his/her direction.

It shall be the duty of the Registrar:

- 1) To be the custodian of the records, the common seal, and such other property of IUCAA (DTBU) as the Executive Council shall commit to his/her charge.
- 2) To issue all notices convening meetings of the Executive Council, the Academic Council and of any Committees appointed by those authorities.
- 3) To keep the minutes of all the meetings of the Executive Council, the Academic Council and of any Committees appointed by those authorities.
- 4) To conduct the official correspondence of the Executive Council and the Academic Council.
- 5) To make available to the Chancellor copies of the agenda of the meetings of the authorities of IUCAA (DTBU) as soon as they are issued and the minutes of such meetings.
- 6) To represent IUCAA (DTBU) in suits or proceedings by or against the University, sign powers of attorney and verify pleadings or depute his representative for the purpose.
- 7) To perform such other duties as may be specified in the Rules or as may be required from time to time by the Executive Council or the Vice-Chancellor.

- 8) To enter into agreement, sign documents and authenticate records on behalf of IUCAA (DTBU).
- 9) To conduct the official correspondence on behalf of the authorities of the IUCAA (DTBU).

**Finance Officer:**

The Administrative Officer (AO)-Finance of the Centre shall perform additional duties as the finance office of the proposed IUCAA (DTBU).

When the office of the Finance Officer is vacant or when the finance Officer is, by reason of illness, absence or any other cause, unable to perform the duties of his/her office, the duties of the office shall be performed by such persons as the Vice-Chancellor may appoint for the purpose.

The Finance Officer shall be a permanent invitee to the Finance Committee but shall not be deemed a member of such Committee.

The Finance Officer shall

- 1) Exercise general supervision over the funds of IUCAA (DTBU) and shall advise it as regards its financial policy.
- 2) Perform such other financial functions as may be assigned to him by the Executive Council or as may be prescribed by the Rules of IUCAA (DTBU).

Subject to the control of the Executive Council, the Finance Officer shall:

- 1) Ensure that the limits fixed by the Executive Council for recurring and non-recurring expenditure for a year are not exceeded and that all amounts of money are expended on the purpose for which they are granted or allotted
- 2) Be responsible for the preparation of annual accounts and the budget of the IUCAA (DTBU) and for their presentation to the Executive Council
- 3) Keep a constant watch on the state of the cash and bank balances and on the state of investments
- 4) Watch the progress of the collection of revenue and advice on the methods of collection employed
- 5) Ensure that the registers of buildings, land, furniture, and equipment are maintained and up-to-date and stock-checking is conducted, of equipment and other consumable materials in the DTBU.
- 6) Bring to the notice of the Vice-Chancellor unauthorised expenditure and other financial irregularities and suggest disciplinary action against persons at fault.
- 7) Call for from any Office, Department, Laboratory, etc. maintained by the DTBU any information or returns that he/she may consider necessary for the performance of his/her duties.
- 8) The Finance Officer shall work under the direction of the Vice-Chancellor and shall be responsible to the Executive Council through the Vice-Chancellor.

**Dean:**

The Centre will have at least two deans, one supervising the core academic programmes of the centre (IUCAA (DTBU)) and the other supervising its visitor academic programmes.

i. The Dean, Core Academic Programmes (Dean, CAP) will assist the Vice Chancellor of IUCAA (DTBU) (Director of the centre) in formulating Center's academic programmes, R and D activities, and other such activities as the Vice Chancellor of IUCAA (DTBU) (Director of the Centre) may delegate to the Dean, CAP.

ii. The Dean, Visitor Academic Programmes (Dean, VAP) will assist the Vice Chancellor of IUCAA (DTBU) (Director of the Centre) in monitoring IUCAA's associateship programme, the schools and workshops activities, arrangements for visiting faculty and any other activities the Vice Chancellor of IUCAA (DTBU) (Director of the Centre) may delegate to him or her, arising from IUCAA's coordinating role in the university sector.

iii. The Departments dealing with allied subjects may be grouped into faculties or schools, etc., and every faculty shall be headed by a Dean.

iv. Every Dean of the school or faculty shall be appointed by the Vice-Chancellor from amongst the Professors in the school or faculty, by rotation, for a period of three years: PROVIDED that if there is only one Professor or no Professor in a school or faculty, the Dean shall be appointed, for the time being, from amongst the Professor, if any, and the Associate Professors in the school or faculty.

v. When the office of the Dean is vacant or when the Dean is, by reason of illness, absence or any other cause, unable to perform duties of his or her office, the duties of the office shall be performed by the senior-most Professor or Associate Professor, as the case may be, in the School.

vi. The Dean shall be the Head of the school or faculty or centre and shall be responsible for the conduct and maintenance of the standards of teaching and research in the school or faculty or centre and shall have such other functions as may be prescribed by the rules of the institution deemed to be University.

vii. The Dean shall have the right to present and speak at any meeting of the Board of Studies or Committees of the school or faculty or centre, as the case may be, but shall not have the right to vote there unless he /she is a member thereof.

**Head of the Department:**

The Director IUCAA (Vice Chancellor of IUCAA (DTBU) in consultation with the deans would appoint one faculty member at the Professor level as the Head of each Department, for a period of two years.

Provided that if there is no Professor or Scientist of equivalent grade in the Department or there is only one Professor in the Department or Scientist of equivalent grade whose term as Head of the

Department of the Centre, the Vice-Chancellor may appoint an Associate Professor or Scientist of equivalent grade as Head of the Department.

The term of the Head of the Department shall normally be two years and he/she shall be eligible for reappointment for one more term.

The powers and functions of the Head of the Department shall be prescribed by Rules of the DTBU.

Notwithstanding anything contained in these Regulations, the governance system and management structure of the DTBU managed/ controlled/ receiving funds more than or equal to 50% of its annual expenditure from the Central Government or the State Government shall be in accordance with the decision of the appropriate Government.

## **Admission and fees structure**

### **Admission**

Admission of students to IUCAA (DTBU) shall be strictly based on merit in the entrance exam conducted by a Government Testing Agency or IUCAA (DTBU) and as prescribed by the appropriate statutory authority, wherever applicable and in case of no entrance examination, the admission of students to IUCAA (DTBU) may be made in the manner specified in the prospectus.

### **Fee structure**

- 1) Donation or capitation fee in whatever nomenclature or form, either directly or indirectly, is strictly prohibited.
- 2) The IUCAA (DTBU) shall follow the rules and regulations regarding fee structure, number of seats, etc., issued by the relevant statutory bodies and in case IUCAA (DTBU) offers different courses which come under the regulatory ambit of different statutory bodies, namely the University Grants Commission, the All India Council of Technical Education, National Medical Council etc., the rules and regulations regarding fee structure, number of seats, etc., issued by such statutory body concerned shall be applicable.
- 3) The fee shall be fixed transparently, keeping in view non-profiteering or non-commercial aspects.
- 4) The fee shall be collected as declared in the prospectus of IUCAA (DTBU) and with a proper receipt for such payment and the prospectus shall also state that donation or capitation fee in whatever nomenclature or form, either directly or indirectly, shall not be collected from the student or parent and in case of any grievance, the student or parent may submit their complaint to IUCAA (DTBU).
- 5) IUCAA (DTBU) may provide fee concession or scholarships or may allocate some seats to meritorious students belonging to socially and economically deprived groups of the society.
- 6) IUCAA (DTBU) shall abide by all the University Grant Commission notifications, guidelines regarding the refund of fees and return of original certificates, as may be issued from time to time.
- 7) Every institution deemed to be University shall maintain the records of the entire process of selection of candidates, exhibit such records on its website, and preserve such records for a minimum period of five years.

- 8) IUCAA (DTBU) shall make available the prospectus on its website at least sixty days before the commencement of admissions, including fee structure, refund policy, number of seats in a programme, eligibility qualifications, admission process, etc.
- 9) IUCAA (DTBU) shall not retain any original certificates of the students, faculty members, and staff.

**Detailed Project Report (DPR)**  
**for the declaration of**  
**Inter-University Centre for Astronomy and Astrophysics (IUCAA),**  
**as a Deemed-to-be-University**

**Annexure - I**  
**Proposed Course Structure**



**February 2024**

**PUNE**

<b>M.Sc. (Physics with Astrophysics)</b> <i>[M.Sc. (P/Ap)]</i>			
<i>Semester I</i>	<i>Semester II</i>	<i>Semester III</i>	<i>Semester IV</i>
Mathematical Methods (4 cr)	Statistical Mechanics (4 cr)	Intro. to Astronomy & Astrophysics (4 cr)	Astrophysics Dynamics (4 cr)
Classical Mechanics (4 cr)	Advanced Quantum Mechanics (2 cr)	Radiative Processes (4 cr)	Nuclear Physics (4 cr)
Quantum Mechanics (4 cr)	Electrodynamics - II (2 cr)	Astronomical Techniques (4 cr)	
Electrodynamics - I (4 cr)	Electronics (4 cr)	General Relativity - I (2 cr)	
	Atomic & Molecular Physics (2 cr)		
Physics Lab + (Python) Programming - I (4 cr)	Physics Lab + (Python) Programming - II (4 cr)	Astrophysics Lab - I (2 cr)	Astrophysics Lab - II (2 cr)
	Solid State Physics (2 cr)	Project (2 cr) [continued to next semester]	Project (4 cr) [continued from prev. semester]
		Electives (1 x 2 cr)	Electives (3 x 2 cr)
		<i>Possible electives (**)</i> Comp. Astrophysics - I (2 cr)	<i>Possible electives (**)</i> Fluids & Plasmas - I (2cr) Galaxies and ISM - I (2 cr) HEA - I (2 cr) Cosmology - I (2 cr)  (any 3 will satisfy requirements)
<b>Total: 20 credits</b>	<b>Total: 20 credits</b>	<b>Total: 20 credits</b>	<b>Total: 20 credits</b>
<p><i>N.B.: 1 credit (cr) = 15 contact hours (lecture/tutorial) or 30 contact hours (lab)</i>  <i>** elective credits are compulsory</i></p> <p><b><i>Ph.D. option:</i></b> Students who successfully complete this 2-year M.Sc. programme and are also selected for the Ph.D. (Physics with Astrophysics) programme through the appropriate selection channel will only need to complete those core courses which were not opted for as electives in the M.Sc. Semesters III and IV.</p>			

## Integrated M.Sc.-Ph.D (Physics with Astrophysics)

[I-Ph.D. (P/Ap)]

<i>Semester I</i>	<i>Semester II</i>	<i>Semester III</i>	<i>Semester IV</i>	<i>Semester V</i>	<i>Semester VI</i>
Mathematical Methods (4 cr)	Statistical Mechanics (4 cr)	Intro. to Astronomy & Astrophysics (4 cr)	Astrophysics Dynamics (4 cr)	Research Methodology (2 cr)	Ph.D. core course (2 cr)  <i>one out of F&amp;P-I, G&amp;ISM-I, HEA-I or Cosmo-I which was not opted in Sem-IV</i>
Classical Mechanics (4 cr)	Advanced Quantum Mechanics (2 cr)	Radiative Processes (4 cr)	Nuclear Physics (4 cr)		
Quantum Mechanics (4 cr)	Electrodynamics - II (2 cr)	Astronomical Techniques (4 cr)			
Electrodynamics - I (4 cr)	Electronics (4 cr)	General Relativity - I (2 cr)			
	Atomic & Molecular Physics (2 cr)				
Physics Lab + (Python) Programming - I (4 cr)	Physics Lab + (Python) Programming - II (4 cr)	Astrophysics Lab - I (2 cr)	Astrophysics Lab - II (2 cr)	Project - I (6 cr)	
	Solid State Physics (2 cr)	M.Sc. Project (2 cr) [continued to next semester]	M.Sc. Project (4 cr) [continued from prev. semester]	Project - II (6 cr)	Project - III (6 cr) <b>[optional]</b>
		Electives (1 x 2 cr)	Electives (3 x 2 cr)	Electives (1 x 2 cr)	
		<u>Possible electives</u> (**) Comp. Astrophysics - I (2 cr)	<u>Possible electives</u> (**) Fluids & Plasmas - I (2cr) Galaxies and ISM - I (2 cr) HEA - I (2 cr) Cosmology - I (2 cr)  (any 3 will satisfy requirements)	<u>Possible electives</u> (+) Comp. Astrophysics - II (2 cr)  General Relativity - II (1 cr) [with Cosmo-II]  (any 1 will satisfy requirements)	<u>Possible electives</u> (+) Fluids & Plasmas - II (2cr) Galaxies and ISM - II (2 cr) HEA - II (2 cr)  Cosmology - II (1 cr) [with GR-II]  (any 1 will satisfy requirements)
<b>Total: 20 credits</b>	<b>Total: 20 credits</b>	<b>Total: 20 credits</b>	<b>Total: 20 credits</b>	<b>Total:</b> <b>14 core credits</b> <b>3 elective credits</b>	<b>Total:</b> <b>2 core credits</b> <b>7 elective credits</b>

N.B.: 1 credit (cr) = 15 contact hours (lecture/tutorial) or 30 contact hours (lab)

\*\* elective credits are **compulsory**

+ **at least 2 elective credits** (satisfying corresponding pre-requisites) must be compulsorily completed **by end of 3rd year.**

<b>Ph.D (Physics with Astrophysics)</b> <i>[Ph.D. (P/Ap)]</i>	
<i>Semester I</i>	<i>Semester II</i>
<u>Core</u>	<u>Core</u>
Intro. to Astronomy & Astrophysics (4 cr)	Fluids & Plasmas - I (2 cr)
Radiative Processes (4 cr)	Galaxies & ISM - I (2 cr)
Astronomical Techniques (4 cr)	High Energy Astrophysics (HEA) - I (2 cr)
General Relativity - I (2 cr)	Cosmology - I (2 cr)
Computational Astrophysics - I (2 cr)	Project (4 cr)
Research Methodology (2 cr)	
<u>Elective</u>	<u>Elective</u>
Computational Astrophysics - II (2 cr)	Fluids & Plasmas - II (2 cr)
	Galaxies & ISM - II (2 cr)
	High Energy Astrophysics (HEA) - II (2 cr)
General Relativity - II (1 cr)	Cosmology - II (1 cr)
<b>Remedial modules</b> (*) Statistical Mechanics Quantum Mechanics Electrodynamics	
<b>Total:</b> <b>18 core credits</b> 3 elective credits (+)	<b>Total:</b> <b>12 core credits</b> 7 elective credits (+)
<i>N.B.: 1 credit (cr) = 15 contact hours (lecture/tutorial)</i> <i>* each remedial module comprises 7 contact hours, counting towards 'remedial credits'</i> <i>+ at least 2 elective credits must be compulsorily completed by end of 2<sup>nd</sup> year</i>	

<b>Ph.D (Physics with Gravitational Science)</b> <i>[Ph.D. (P/Grav)]</i>	
<i>Semester I</i>	<i>Semester II</i>
<u>Core</u>	<u>Core</u>
Intro. to Astronomy & Astrophysics (4 cr)	Cosmology - I (2 cr)
Radiative Processes (4 cr)	
Astronomical Techniques (4 cr)	Experiments for Gravitation (1 cr)
General Relativity - I (2 cr)	Data Analysis for GW - I (1 cr)
General Relativity - II (1 cr)	
Computational Astrophysics - I (2 cr)	Numerical Relativity (1 cr)
Gravitation Lab (1 cr)	Gravitation Lab (1 cr)
Research Methodology (2 cr)	Project (4 cr)
<u>Elective</u>	<u>Elective</u>
Computational Astrophysics - II (2 cr)	Fluids & Plasmas - I (2 cr)
	High Energy Astrophysics - I (2 cr)
	Interferometric GW detectors (1 cr)
	Quantum Aspects of Gravitation (1 cr)
	Alternate Theories of Gravity (1 cr)
	Post-Newtonian & Perturbation Theories (1 cr)
	Data Analysis for GW - II (1 cr)
	Gravitational Wave Astronomy (1 cr)
<b><u>Remedial modules</u></b> (*) Statistical Mechanics Quantum Mechanics Electrodynamics	
<b>Total:</b> <b>20 core credits</b> 2 elective credits (+)	<b>Total:</b> <b>10 core credits</b> 10 elective credits (+)
<i>N.B.: 1 credit (cr)= 15 contact hours (lecture/tutorial)</i> <i>* each remedial module comprises 7 contact hours, counting towards 'remedial credits'</i> <i>+ at least 2 elective credits must be compulsorily completed by end of 2<sup>nd</sup> year</i>	

## M.Sc. (Physics with Computational Astrophysics)

[M.Sc. (P/CA)]

<i>Semester I</i>	<i>Semester II</i>	<i>Semester III</i>	<i>Semester IV</i>
Mathematical Methods (4 cr)	Statistical Mechanics (4 cr)	Intro. to Astronomy & Astrophysics (4 cr)	Astrophysics Dynamics (4 cr)
Classical Mechanics (4 cr)	Advanced Quantum Mechanics (2 cr)	Radiative Processes (4 cr)	Computational Fluid Dynamics (2 cr)
Quantum Mechanics (4 cr)	Electrodynamics - II (2 cr)	Computational Methods (4 cr)	Numerical Simulation Techniques (2 cr)
Electrodynamics - I (4 cr)	Electronics (4 cr)	Basic Computing & Programming Languages (2 cr)	
	Atomic & Molecular Physics (2 cr)		
Physics Lab + (Python) Programming - I (4 cr)	Physics Lab + (Python) Programming - II (4 cr)	Data Analysis - I (2 cr)	Data Analysis - II (2 cr)
	Solid State Physics (2 cr)	Project (2 cr)	Project (4 cr)
		Electives (1 x 2 cr)	Electives (3 x 2 cr)
		<i>Possible electives (**)</i> General Relativity - I (2 cr)	<i>Possible electives (**)</i> Fluids & Plasmas - I (2cr) Galaxies and ISM - I (2 cr) HEA - I (2 cr) Cosmology - I (2 cr)  (any 3 will satisfy requirements)
<b>Total: 20 credits</b>	<b>Total: 20 credits</b>	<b>Total: 20 credits</b>	<b>Total: 20 credits</b>

*N.B.: 1 credit (cr) = 15 contact hours (lecture/tutorial) or 30 contact hours (lab)*

*\*\* elective credits are compulsory*