Patron
Prof. N V Ramana Rao
Director, NIT, Warangal-506004

Foreign faculty
Professor Sivakumar Manickam
Petroleum and Chemical Engineering, Universiti Teknologi, Brunei.

Indian Faculty
Dr. Aniruddha B. Pandit
Institute of Chemical Technology, Mumbai

Dr. Shriram Sonawane
Visvesvaraya National Institute of Technology Nagpur.

Course Coordinator
Dr. Shirish Sonawane
Professor, Chemical Engg Department
NIT, Warangal-506004
( shirish@nitw.ac.in)

Co-coordinator
Dr. Prakash Saudagar
Assistant Professor
Biotechnology Department
NIT, Warangal-506004

Registration Fees

<table>
<thead>
<tr>
<th>Category</th>
<th>Fee</th>
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<tbody>
<tr>
<td>Participants from abroad</td>
<td>US $400</td>
</tr>
<tr>
<td>Industry/Research Organizations</td>
<td>Rs. 5,000/-</td>
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<tr>
<td>Academic Institutions:</td>
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<tr>
<td>Faculty and Scientist Students</td>
<td>Rs. 2000/-</td>
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<tr>
<td>Students with award of grade</td>
<td>Rs 1000/-</td>
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<tr>
<td>Students with award of grade</td>
<td>Rs 1500/-</td>
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The above fees include all instructional materials, computer use for tutorials, free internet facility, tea and snacks. The course fee is inclusive of 18% GST as per institute norm. The participants may avail single bedded shared accommodation and food (breakfast, lunch and dinner) if requested on an additional payment basis.

Last Date of Registration: 20 May, 2022

Greener and Cleaner Ultrasonic Process for Nanomaterials and Nanopharmaceuticals

27 June -1 July, 2022 (Offline)
How to Apply:

Stage-1: Web Portal Registration:
Visit http://www.gian.itkgp.ac.in/GREGN/index and create login User ID and Password. Fill up the registration form to complete web registration by online payment of Rs. 500/-. This provides the user with lifetime registration to enroll in any number of GIAN courses offered.

Stage-2: Course Registration:
Login to the GIAN portal with the user ID and Password already created in Step 1. Click on Course Registration option at the top of Registration form. Select the Course titled “Greener and cleaner ultrasonic process for nanomaterials and nanopharmaceuticals” from the list and click on save option. Confirm your registration by clicking on “Confirm Course”. Course will be offline.

Details for NEFT

<table>
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<tr>
<th>Account No.</th>
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<td>Branch Code</td>
<td>20149</td>
</tr>
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<td>IFSC</td>
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<td>SWIFT Code</td>
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Note: For confirmation of registration, the proof of payment (a scanned copy Demand Draft/NEFT transaction details) along with the registration form and copy of PDF generated at GIAN portal (if registered through GIAN portal) are to be e-mailed to shirish@nitw.ac.in

Candidates registering early will be given preference in short listing process.

For any queries regarding registration of the course, please contact the course coordinator.

Who can participate?

- This program is open to the faculty, PG students, and research scholars working or interested in the aligned area.
- Engineers/Scientists working in Industries, Interested in process intensification of chemical processes.

Selected candidates will be intimated through e-mail. They have to remit the necessary course fee (Mandatory for all) and boarding & lodging fee (if boarding & lodging is required) to the Bank as per the details given below.

1. Name (in block letters): .................................................................
2. Gender: ........................................................................
3. Category: Student/Non-Student/Industry
4. Address: ........................................................................
5. Telephone/Mobile No. ...........................................................
6. E-mail ID: ........................................................................
7. Highest academic qualification: ............................................
8. NEFT transaction number/DD number ..................................
9. Date of transaction ..............................................................
10. Amount ..........................................................
About NIT Warangal
National Institute of Technology Warangal, formerly known as Regional Engineering College was established in 1959. Over the years it has developed into a premier institute of higher learning and is ranked among the top technical education institutions in India. There are 14 Departments offering eight undergraduate and 31 post-graduate programmes besides doctoral programmes. About 5000 students across the country and about 500 international students' study in the campus. It is a fully residential campus sprawling over 250 acres with excellent infrastructure.

About Warangal: Warangal is the second largest city of the state of Telangana. It is situated at a distance of 140 km from the state capital Hyderabad (Nearest Airport). It is well connected by Rail (Kazipet Junction is 2 km away and Warangal Station is 12 km away) and by Road (NH 202). Warangal is renowned for its rich historical and cultural heritage. It was the seat of erstwhile 5th Kakatiya dynasty. It is a place of tourist attraction with a number of historical monuments like Thousand Pillars Temple, Warangal Fort, Bhadrakali Temple, Ramappa Temple and Lankavaram Lake.

Overview of the Course
The ultrasound (US) can play key role in the production of active pharmaceutical ingredients (APIs). It also has the wide applications in pharmacy such as in controlling particle size, controlled crystallization, production of nano materials, enhancing the solubility of poorly soluble drug candidates. Furthermore, the use of ultrasound during the tableting of pharmaceutical powders is a new emerging area. Ultrasound improves the characteristics of the compression process leading to optimized mechanical strength of the compacts without applying excessive compression force. Therefore, problems associated with high-pressure compression in tableting can be overcome and tablets may be manufactured more economically and consistently with the aid of ultrasound compared to conventional pressure processes. The countless achievements of API US-assisted production with outstanding effects such as narrower particle size distribution; decreased particle size, induction time, metastable zone and super-saturation levels; or a solubility increase. The process of drug (API) manufacturing can be broken down into a series of unit operations, such as sifting of ingredients, mixing and lubrication and encapsulation (filling) and polishing. Ultrasound plays a vital role in manufacturing nanomaterials and pharmaceuticals with both cost-effective manner and environment friendly. This course will be highlighting both the fundamental and applied aspects of Sonochemistry and synthesis routes for nanomaterials and pharmaceuticals with a specific focus on greener and cleaner processes.

The primary objectives of the course are as follows:
(i) Take an attention of participants and industrial persons towards ultrasonic processes as it is green and clean route for synthesis of value added products.
(ii) Exposing participants to the fundamentals of acoustic and hydrodynamic cavitation and sonoprocess engineering.
(iii) Exposing participants to the fundamentals of acoustic and hydrodynamic cavitation and sonoprocess engineering.
(iv) Overview of different paths for nanomaterial synthesis using ultrasound approach and its benefits over conventional synthesis routes
(v) Overview and guideline for different pharmaceuticals processes where ultrasound technology can be considered as green and clean route of synthesis.

Day 1:
Applications of ultrasound pharmaceuticals, food industries, waste water treatment

Day 2:
Explain the pharmaceutical process basics: Pharmaceuticals and active pharmaceuticals ingredients (API) synthesis processes with ultrasound cavitation
Ultrasound technology in pharmaceuticals: sifting of ingredients, mixing and lubrication and encapsulation (filling) and polishing

Day 3:
Encapsulation technology for active drug molecules with ultrasound technology: Encapsulation of bioactive drug molecule with ultrasound approach.
Role of ultrasound in emulsion preparation in pharmaceutical industries
Emulsion preparation, emulsion stability

Day 4:
Pharmaceutical processes with ultrasound: Crystallization, emulsification, Potential of ultrasound in process intensification in pharmaceutical industries

Day 5:
Scale up of Ultrasonic process: Hydrodynamic cavitation approach in scale up
Examination for Students