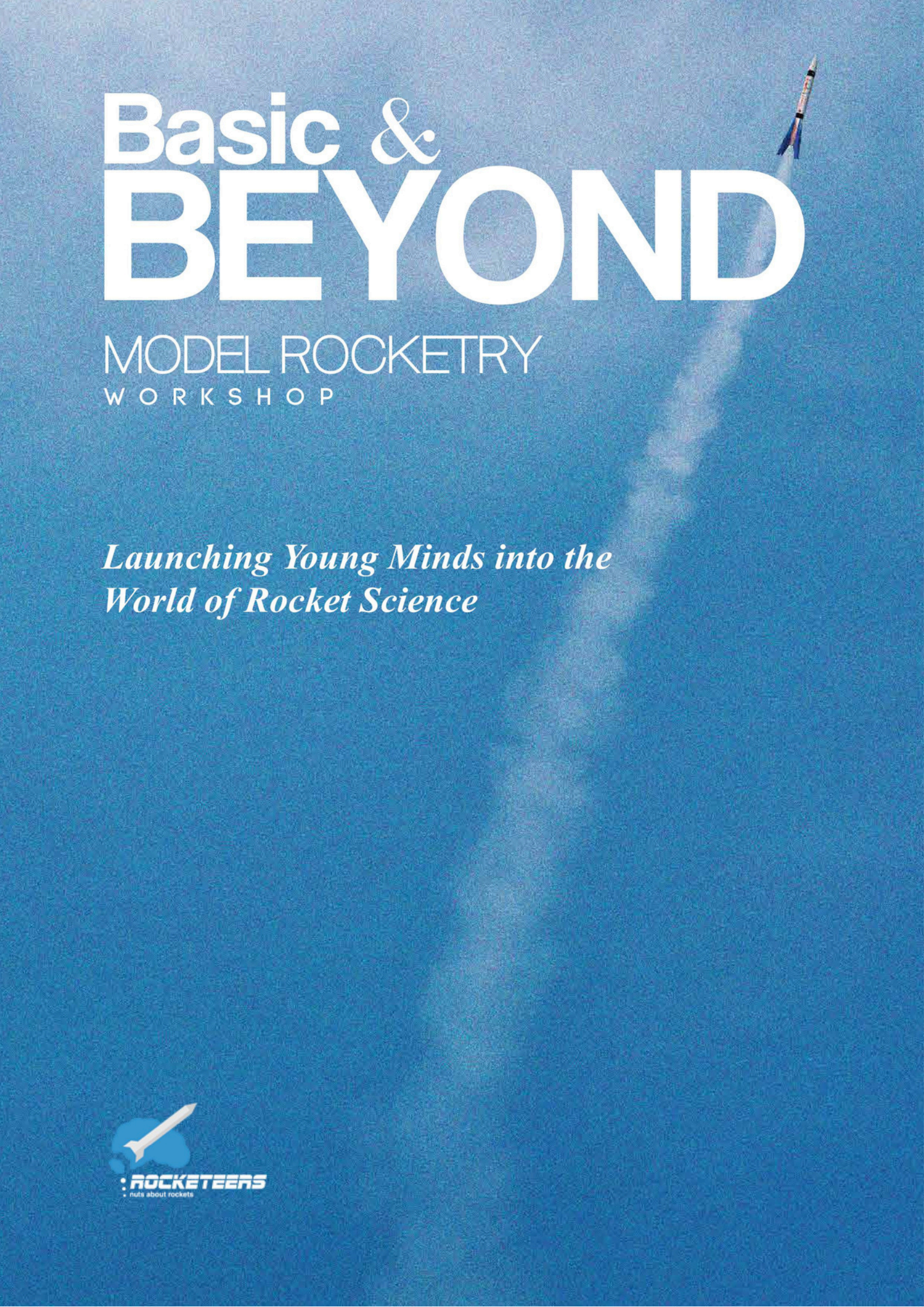

Basic & BEYOND

MODEL ROCKETRY WORKSHOP

Launching Young Minds into the World of Rocket Science

ROCKETEERS
nuts about rockets

A rocketeers
Initiative

ISRO's move towards privatisation heralds a new era of space exploration in India. We're stepping up to foster an ecosystem that will be the cradle of tomorrow's rocket scientists. Our nationwide educational platform is a gateway for students to immerse in hands-on STEM learning, empowering them to spearhead future Mars missions and explore new frontiers. Through a scientifically devised curriculum and tech-enabled processes, we're making rocket science accessible, enjoyable, and intuitive for aspiring innovators across the country.

Welcome to the
Rocketeers

At Rocketeers Research Institute, we're building a robust foundation for space exploration within the classrooms of India. In partnership with ISRO, our workshops are designed to spark a lifelong interest in STEM and provide a practical pathway for aspiring young rocket scientists.

Why Model
Rocketery

Model rocketry isn't just about the thrill of launch. It's an educational tool that reinforces physics concepts, nurtures critical thinking, promotes teamwork, and instils a growth mindset.

Workshop Structure

Advanced Amateur Rocketry Workshop

Duration: Two Days (7-8 hours)

Day 1: Foundations of Rocketry & Practical Engineering

Introduction to Model Rocketry (60 mins)

A comprehensive primer on the world of model rocketry:

- Evolution of amateur and model rocketry in India and globally
- Overview of rocketry classifications (model, amateur, orbital)
- Safety protocols and regulatory framework
- Applications in education, research, and innovation

Theory of Rocketry (2 sessions, 60 mins each)

Deep dive into the fundamental principles of rocket design and function:

- Rocketry Principles: Newton's laws, thrust equation, impulse
- Aerodynamics: Drag, lift, stability, fins, and aerodynamic surfaces
- Propulsion: Solid rocket motors, fuel compositions, burn rates
- Structures & Materials: Load-bearing components, heat shielding, casing materials
- Design & Stability: Center of Gravity (CG), Center of Pressure (CP), static margin, and dynamic stability concepts

Rocket Design & Simulation Tools (90 mins)

Hands-on digital session:

- Introduction to OpenRocket for simulating rocket flight and design iterations
- Use of BurnSim to simulate motor configurations and thrust curves
- Participants begin designing their own rocket and configuring custom motor setups using the software

Practical Lab Sessions (2 sessions, 60 mins each – rotated in two batches)

- Propellant Cooking & Casting Masterclass
  - Live demonstration of composite propellant mixing and safe casting by Rocketeers experts
  - Discussion on propellant chemistries, safety measures, and casting techniques
  - Q&A during live casting to clarify doubts around fuel properties and procedures
- Rocket Fabrication Session
  - Participants build physical models of their designed rockets using guided templates
  - Learn to work with structural materials, adhesives, nozzles, and recovery systems
  - Focus on translating simulation designs into real-world builds with precision

Workshop Structure

Advanced Amateur Rocketry Workshop

Duration: Two Days (7-8 hours)

Day 2: Launch, Analyze & Reflect

Final Integration & Range Safety Briefing (180 mins)

A comprehensive session to prepare for launch day:

- Motor assembly and integration
- Final rocket integration and inspection
- Pre-flight checks and system validation
- Detailed range safety briefing
- Launch site protocols and operational roles

Model Rocket Launch Session (120 mins)

Field-based session for testing the built rockets:

- Pre-launch checklists, safety procedures, and team assignments
- Live launches of participant rockets under expert supervision
- Measurement and observation of flight performance, altitude, stability, and recovery

Flight Analysis & Technical Discussion (30 mins)

Post-launch group session to analyze:

- Comparative performance of different rocket designs
- Lessons in engineering trade-offs, design flaws, and real-world outcomes
- Video review, flight logs, and simulated vs. actual flight comparisons

Feedback & Open Q&A (30 mins)

- Open floor for participant queries, doubts, and deeper exploration of concepts
- Collecting structured feedback to refine future workshops
- Certification and concluding remarks

Participant Kit Inclusions

Each participating team will receive a comprehensive kit designed to support the full rocketry experience:

1. DIY Rocket Structural Pack

A modular pack enabling full customization of rocket design:

- Body tubes (varied sizes)
- Fin sets (multiple profiles)
- Nose cones (assorted geometries)
- Internal mounting supports
- Motor mount assemblies
- Couplers, bulkheads, and centering rings

2. Propulsion Consumables & Nozzle Assembly

Materials required for solid motor integration:

- Pre-fabricated nozzles
- Casting tubes and liners
- Inhibitor surfaces, pressure seals, grease, circlips
- Pre-measured fuel and oxidizer (handled under supervision)

3. Reusable Motor Hardware

- Motor casing and end closures
- Retention and assembly components

Note: All reusable motor hardware is to be used strictly under supervision. After the workshop, this equipment must be returned to Rocketeers.

Workshop Equipment Provided by Rocketeers

To facilitate propellant casting, curing, and rocket launches, Rocketeers will provide the following specialized equipment:

- Launch pads and ignition systems
- Propellant casting tools: induction stove, pans, trays, sieves
- Core rods, casting bases, and other precision casting equipment

Note: All equipment is to be used strictly under supervision. After the workshop, this equipment must be returned to Rocketeers.

Workshop Pricing

Rs. 3,000 Per Kit + 18% GST

Rs. 44,000 + 18% GST, Trainers Fee (Two Rocketeers Educators)

The cost of shipping kits and rocketry-related material to the institution/venue will be charged as per actuals.

Rs.22,000 + 18% GST, (for every additional Rocketeers Educators)

Terms & Conditions

- Minimum: 20 Rockets
- Maximum: 30 Rockets
- 50% payment to be made 20 days prior to the workshop date
- Remaining 50% payable upon arrival at the venue
- Total participant count to be confirmed 20 days before the workshop
- All travel, accommodation, and meal costs for Rocketeers personnel to be borne by the host institution.
- Shipping of kits and materials will be charged at actuals

Logistics Required for Workshop

- Classroom or hall to accommodate all registered students
- Rocket assembly area with sturdy worktables for student teams
- Projector, screen, microphone, and audio system
- Whiteboard and markers
- Ground/open space measuring 50x50 meters for launch activity
- Two staff members to help manage students
- Four student volunteers to assist with launch operations
- Propellant Casting Area: a large, well-ventilated open room with an easy evacuation plan and large work tables, with electric point access
- At least three fire extinguishers stationed near the casting area
- Organisers must ensure that all Rocketeers-provided equipment is shipped back post-workshop

Learning Outcomes

- Comprehensive Understanding: Delve into the physics of rocket science with a hands-on approach.
- Bridging Theory and Practice: Apply theoretical knowledge in real-world scenarios.
- Holistic Learning: Explore physics, equations, and systems design, and experience rocket launching.
- Real-World Applications: Understand the interplay between math, physics, and tangible applications.
- Rekindled Passion for Science: Reignite a love for science through experiential learning.
- Invitation to Explore: Opportunity to host the Model Rocketry Workshop at your institute for an enriched educational experience.

Benefits

- Certification: From Rocketeers and the International Space Society.
- Rocketeers Kit: Rocket, motor, accessories, manuals, space-themed poster, and fins.
- Expert Guidance: Learn from ISRO scientists with free career counselling.
- Lifetime Membership: To the Rocketeers Model Rocketry Club.
- International Exposure: Build and fly model rockets with NAR(USA), and explore abroad opportunities.
- Institute Empowerment: Receives launchers and ignition systems for club activities and integration of model rocketry into student life.