

## SYLLABUS

Next course: 27 Feb-1 Mar 2024

Armament University, Picatinny Arsenal, NJ

### Gun Barrel Design and Associated Ballistics

**COURSE NUMBER: GIQI001**

**Overview:** This course covers the most important aspects of spin stabilized tube-launched projectiles for small arms and medium caliber cannons. It begins with a comprehensive study into the design, analysis, testing, and manufacture of gun barrels including new and evolving technologies. It then delves into the study of interior and exterior ballistics, terminal effects, wound ballistics to include international laws governing ammunition design.

**Goals:** To present the relevant technologies and their mechanics while illustrating with case histories and lessons learned based on the extensive experience of the lecturers. At course completion, the student will be armed with the technical knowledge of the aspects important to gun barrel design, ammunition performance, and the inseparable interaction between them. It concludes with the Laws of War and legal implications.

At course completion students will be prepared to:

- Design and evaluate gun barrels with consideration to all disciplines and technologies while avoiding common mistakes.
- Comprehend the interaction between projectile and barrel through the launch cycle following through to the dynamics of the projectiles' path to the target.
- Evaluate the latest barrel manufacturing technology options, understanding the advantages and limitations of each.
- Design systems with considerations into wound ballistics and Laws of War.

**Lectures:** This will be an in-person course, taught at an informal level with interaction between student and lecturer encouraged. There are four (4) 1-day sessions each lasting approximately 8 hours.

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## Texts and Related Course Material

Each student will receive course manuals and an electronic bibliography of relevant books, reports, and other salient technical documents.

### Course Topics

<b>Day 1:</b> <ul style="list-style-type: none"><li>• Barrel Design for Application</li><li>• System Accuracy Life</li><li>• Barrel Tube Structure &amp; Design</li><li>• Mechanical &amp; Heat Effects</li><li>• Advanced Barrel Material Study</li><li>• M240 Barrel Life Comparison</li><li>• History of Barrel Material Development</li><li>• Elements of Bore Wear</li><li>• Barrel Liners</li><li>• Powder Metal Technology</li><li>• Industry Perspective</li></ul>	<b>Day 2</b> <ul style="list-style-type: none"><li>• Interior Ballistics</li><li>• Barrel Length Effects</li><li>• Heat Input per Round</li><li>• Rifling and Twist</li><li>• Exterior Ballistics</li><li>• Crown Geometry</li><li>• Mechanical Dampers</li><li>• Barrel Mounting</li><li>• Free Floating Barrels</li><li>• Proof Firing</li><li>• Catastrophic Failure</li></ul>
<b>Day 3</b> <ul style="list-style-type: none"><li>• Barrels Manufactured by Cut Rifling, Button Rifling &amp; Hammer Forge</li><li>• Rifling by EDM and Water Jet</li><li>• OD Fluting</li><li>• Chambering</li><li>• Barrel Inspection and Measurement</li><li>• Barrel Twist Analysis</li><li>• Bore finishes: Chrome, Nitride, Others</li><li>• Headspace</li><li>• Barrel Testing</li><li>• Failure Criteria</li></ul>	<b>Day 4</b> <ul style="list-style-type: none"><li>• Projectile Stability</li><li>• Dispersion/Accuracy</li><li>• Wound Ballistics</li><li>• Ammo Types and Performance</li><li>• Ballistic Performance</li><li>• Measure of Weapon Controllability</li><li>• Barrel Vibration</li><li>• Stopping Power</li><li>• Laws of War and Legal Implications</li></ul>

### Timing and Cost:

For registration and pricing, contact Gun IQ International. Please note: Class size is limited. Early registration is encouraged.