

**Evidence-Based Workout Templates for AI-Based Personal Trainer System**

This report presents scientifically validated workout templates from authoritative sources including the American College of Sports Medicine (ACSM) and the National Strength and Conditioning Association (NSCA). These templates are organized by training split and tailored to specific goals, subgoals, and experience levels. Each template includes weekly structures, exercise recommendations, volume guidelines, and implementation notes based on peer-reviewed research to ensure physiological effectiveness and safety.

**Full Body (FB) Splits**

**Goal: Fat Loss | Subgoal: General | Level: Beginner**

🗓️ **Weekly Structure**:

* 2-3 days per week (non-consecutive days)
* Example: Monday-Wednesday-Friday or Tuesday-Thursday

📋 **Workout Template**:

* **Warm-up**: 5 minutes light cardio + dynamic stretching
* **Resistance Training** (1 set of 8-12 reps to volitional fatigue):
  + Leg Press (or Squat)
  + Chest Press
  + Seated Row
  + Shoulder Press
  + Lat Pulldown
  + Leg Extension
  + Leg Curl
  + Abdominal Curl
  + Lower Back Extension
* **Aerobic Training**: 20 minutes moderate-intensity activity (60-70% max heart rate)
* **Cool-down**: 3-5 minutes light activity + stretching

📊 **Weekly Volume Guidelines**:

* Total weekly sets per muscle group: 2-3 sets
* Training frequency: Minimum 2 days/week for resistance training
* Aerobic activity: Minimum 60 minutes/week (across sessions)

🧠 **Notes**:

* Rest 60-90 seconds between exercises
* Perform each repetition in approximately 6 seconds (2 seconds concentric, 4 seconds eccentric)
* When 12 repetitions can be completed with good form, increase resistance by approximately 5%
* Estimated caloric expenditure: ~300 calories per session

📚 **Scientific Source**: ACSM protocols as examined by Westcott et al. in The Physician and Sportsmedicine (2009), which demonstrated significant improvements in body composition with this approach[[1]](#fn1).

**Goal: Muscle Gain | Subgoal: Hypertrophy | Level: Beginner**

🗓️ **Weekly Structure**:

* 2-3 days per week (non-consecutive days)
* Example: Monday-Wednesday-Friday or Tuesday-Thursday-Saturday

📋 **Workout Template**:

* **Warm-up**: 5-10 minutes light cardio + dynamic movements
* **Resistance Training** (1-3 sets of 8-12 reps per exercise):
  + Squat or Leg Press
  + Bench Press or Chest Press Machine
  + Bent-Over Row or Seated Row Machine
  + Overhead Press or Shoulder Press Machine
  + Pull-up/Lat Pulldown
  + Leg Curl
  + Triceps Extension
  + Biceps Curl
  + Plank or Ab Crunch
* **Cool-down**: 5 minutes light cardio + static stretching

📊 **Weekly Volume Guidelines**:

* Total weekly sets per muscle group: 3-9 sets
* Rest between sets: 60-90 seconds
* Training to muscular fatigue within the repetition range

🧠 **Notes**:

* Focus on proper form over weight lifted
* Progressive overload by increasing weight ~5% when 12 reps can be completed with good form
* Research shows similar lean mass gains with 2-3 days/week training frequency for beginners
* For optimal muscle gain, ensure adequate protein intake (1.6-2.2g/kg/day)

📚 **Scientific Source**: Based on ACSM resistance training guidelines and findings from Westcott et al. (2009) showing significant lean mass gains with twice-weekly resistance training[[1]](#fn1).

**Upper/Lower (UL) Splits**

**Goal: Muscle Gain | Subgoal: Strength | Level: Intermediate**

🗓️ **Weekly Structure**:

* 4 days per week
* Example: Upper (Monday), Lower (Tuesday), Rest (Wednesday), Upper (Thursday), Lower (Friday), Rest (Saturday-Sunday)

📋 **Workout Template**:

* **Upper Day 1**:
  + Bench Press: 3-5 sets of 4-6 reps
  + Barbell Row: 3-5 sets of 4-6 reps
  + Overhead Press: 3 sets of 6-8 reps
  + Pull-ups/Lat Pulldown: 3 sets of 6-8 reps
  + Incline Dumbbell Press: 2-3 sets of 8-10 reps
  + Face Pulls: 2-3 sets of 10-15 reps
* **Lower Day 1**:
  + Squat: 3-5 sets of 4-6 reps
  + Romanian Deadlift: 3 sets of 6-8 reps
  + Leg Press: 3 sets of 8-10 reps
  + Leg Curl: 3 sets of 8-10 reps
  + Calf Raises: 3 sets of 10-12 reps
  + Core work: 2-3 sets of 10-15 reps
* **Upper Day 2**:
  + Incline Bench Press: 3-5 sets of 5-7 reps
  + Weighted Pull-ups or Pulldown: 3-5 sets of 5-7 reps
  + Dumbbell Shoulder Press: 3 sets of 6-8 reps
  + Cable Row: 3 sets of 6-8 reps
  + Triceps Extension: 2-3 sets of 8-10 reps
  + Biceps Curl: 2-3 sets of 8-10 reps
* **Lower Day 2**:
  + Deadlift: 3-5 sets of 4-6 reps
  + Front Squat or Hack Squat: 3 sets of 6-8 reps
  + Walking Lunges: 3 sets of 8-10 reps per leg
  + Leg Extension: 3 sets of 8-10 reps
  + Standing Calf Raises: 3 sets of 10-12 reps
  + Hanging Leg Raises: 2-3 sets of 10-15 reps

📊 **Weekly Volume Guidelines**:

* Total weekly sets per muscle group: 10-16 sets
* Rest periods: 2-3 minutes for main compound lifts, 1-2 minutes for accessory exercises
* Training intensity: RPE 7-9 for main compound movements

🧠 **Notes**:

* Focus on progressive overload for compound movements
* Emphasize proper technique, especially on heavier lifts
* Longer rest periods (2-3 min) for main compound lifts to optimize strength gains
* This split allows for adequate recovery between training the same muscle groups

📚 **Scientific Source**: Based on NSCA's Guide to Program Design principles for strength development, which emphasizes proper sequencing of training in a sport-specific manner and integrates periodization concepts[[2]](#fn2).

**Goal: Fat Loss | Subgoal: Endurance | Level: Intermediate**

🗓️ **Weekly Structure**:

* 4 days per week
* Example: Upper (Monday), Lower (Tuesday), Rest (Wednesday), Upper (Thursday), Lower (Friday), Rest (Saturday-Sunday)

📋 **Workout Template**:

* **Upper Day 1**:
  + Circuit-style training (minimal rest between exercises, 60-90 sec between circuits)
  + Push-ups: 3 sets of 12-15 reps
  + Dumbbell Rows: 3 sets of 12-15 reps
  + Dumbbell Shoulder Press: 3 sets of 12-15 reps
  + Lat Pulldown: 3 sets of 12-15 reps
  + Triceps Pushdown: 2 sets of 15-20 reps
  + Cable Biceps Curl: 2 sets of 15-20 reps
  + 10-15 minutes HIIT cardio (30 sec work/30 sec rest)
* **Lower Day 1**:
  + Circuit-style training
  + Goblet Squats: 3 sets of 15-20 reps
  + Romanian Deadlift: 3 sets of 12-15 reps
  + Walking Lunges: 3 sets of 12-15 reps per leg
  + Leg Curl: 3 sets of 12-15 reps
  + Calf Raises: 3 sets of 15-20 reps
  + Planks: 3 sets of 30-60 seconds
  + 10-15 minutes moderate-intensity cardio
* **Upper Day 2**:
  + Incline Dumbbell Press: 3 sets of 12-15 reps
  + Cable Row: 3 sets of 12-15 reps
  + Lateral Raises: 3 sets of 15-20 reps
  + Face Pulls: 3 sets of 15-20 reps
  + Triceps Extension: 2 sets of 15-20 reps
  + Hammer Curls: 2 sets of 15-20 reps
  + 10-15 minutes HIIT cardio (30 sec work/30 sec rest)
* **Lower Day 2**:
  + Leg Press: 3 sets of 15-20 reps
  + Step-ups: 3 sets of 12-15 reps per leg
  + Bulgarian Split Squats: 3 sets of 12-15 reps per leg
  + Leg Extension: 3 sets of 15-20 reps
  + Seated Calf Raises: 3 sets of 15-20 reps
  + Russian Twists: 3 sets of 20-30 reps
  + 10-15 minutes moderate-intensity cardio

📊 **Weekly Volume Guidelines**:

* Total weekly sets per muscle group: 10-12 sets
* Rest periods: 30-60 seconds between exercises, 60-90 seconds between circuits
* Training intensity: RPE 6-8, focusing on maintaining good form with shorter rest periods

🧠 **Notes**:

* Shorter rest periods increase metabolic demand and caloric expenditure
* Higher rep ranges with moderate loads improve muscular endurance
* Combined resistance and aerobic training maximizes fat loss results
* Estimated caloric expenditure: 400-500 calories per session

📚 **Scientific Source**: Based on ACSM protocols for combined strength and aerobic activity, which demonstrated significant fat loss effects with increased training frequency as shown in Westcott et al. (2009)[[1]](#fn1).

**Push/Pull/Legs (PPL) Splits**

**Goal: Muscle Gain | Subgoal: Hypertrophy | Level: Advanced**

🗓️ **Weekly Structure**:

* 6 days per week (with one rest day)
* Example: Push (Monday), Pull (Tuesday), Legs (Wednesday), Push (Thursday), Pull (Friday), Legs (Saturday), Rest (Sunday)

📋 **Workout Template**:

* **Push Day 1 (Chest emphasis)**:
  + Bench Press: 4 sets of 6-10 reps
  + Incline Dumbbell Press: 4 sets of 8-12 reps
  + Machine Chest Fly: 3 sets of 10-15 reps
  + Seated Shoulder Press: 3 sets of 8-12 reps
  + Lateral Raises: 3 sets of 12-15 reps
  + Triceps Pushdown: 3 sets of 10-12 reps
  + Overhead Triceps Extension: 3 sets of 10-12 reps
* **Pull Day 1 (Back emphasis)**:
  + Barbell Rows: 4 sets of 6-10 reps
  + Pull-ups or Lat Pulldown: 4 sets of 8-12 reps
  + Seated Cable Row: 3 sets of 8-12 reps
  + Chest-Supported Row: 3 sets of 10-12 reps
  + Face Pulls: 3 sets of 12-15 reps
  + Barbell Curl: 3 sets of 8-12 reps
  + Hammer Curl: 3 sets of 10-12 reps
* **Legs Day 1 (Quad emphasis)**:
  + Barbell Squat: 4 sets of 6-10 reps
  + Leg Press: 4 sets of 8-12 reps
  + Leg Extension: 3 sets of 10-15 reps
  + Romanian Deadlift: 3 sets of 8-12 reps
  + Leg Curl: 3 sets of 10-12 reps
  + Standing Calf Raises: 4 sets of 10-15 reps
  + Seated Calf Raises: 3 sets of 12-15 reps
* **Push Day 2 (Shoulder emphasis)**:
  + Overhead Press: 4 sets of 6-10 reps
  + Incline Bench Press: 3 sets of 8-12 reps
  + Cable Chest Fly: 3 sets of 10-15 reps
  + Lateral Raises: 4 sets of 12-15 reps
  + Front Raises: 3 sets of 12-15 reps
  + Close-grip Bench Press: 3 sets of 8-12 reps
  + Triceps Rope Extension: 3 sets of 10-15 reps
* **Pull Day 2 (Biceps emphasis)**:
  + Deadlift: 3 sets of 6-8 reps
  + Weighted Pull-ups or Pulldown: 4 sets of 8-12 reps
  + Single-arm Dumbbell Row: 3 sets of 8-12 reps per arm
  + Straight-arm Pulldown: 3 sets of 12-15 reps
  + Barbell Curl: 4 sets of 8-10 reps
  + Incline Dumbbell Curl: 3 sets of 10-12 reps
  + Preacher Curl: 3 sets of 10-12 reps
* **Legs Day 2 (Hamstring emphasis)**:
  + Romanian Deadlift: 4 sets of 6-10 reps
  + Hack Squat: 3 sets of 8-12 reps
  + Walking Lunges: 3 sets of 10-12 reps per leg
  + Leg Curl: 4 sets of 10-12 reps
  + Leg Extension: 3 sets of 12-15 reps
  + Seated Calf Raises: 4 sets of 12-15 reps
  + Standing Calf Raises: 3 sets of 15-20 reps

📊 **Weekly Volume Guidelines**:

* Total weekly sets per muscle group: 16-22 sets
* Rest periods: 60-90 seconds for most exercises, 90-120 seconds for heavy compound movements
* Training intensity: RPE 7-9, with emphasis on the mind-muscle connection

🧠 **Notes**:

* This high-frequency, high-volume approach is suitable for advanced lifters with good recovery capabilities
* Daily undulating periodization can be implemented by varying rep ranges across the week
* Focus on achieving muscle failure on isolation exercises in the final sets
* Consider deloading every 4-6 weeks to prevent overtraining
* Nutrition should support high training volume (caloric surplus, 1.6-2.2g protein/kg/day)

📚 **Scientific Source**: Based on NSCA's Guide to Program Design principles regarding hypertrophy training, which emphasizes appropriate volume, intensity, and exercise selection for maximizing muscle growth[[2]](#fn2).

**Goal: Fat Loss | Subgoal: Recomposition | Level: Intermediate**

🗓️ **Weekly Structure**:

* 5 days per week
* Example: Push (Monday), Pull (Tuesday), Legs (Wednesday), Rest (Thursday), Push (Friday), Pull (Saturday), Rest (Sunday)

📋 **Workout Template**:

* **Push Day 1**:
  + Bench Press: 3 sets of 8-10 reps
  + Incline Dumbbell Press: 3 sets of 10-12 reps
  + Dumbbell Shoulder Press: 3 sets of 10-12 reps
  + Lateral Raises: 3 sets of 12-15 reps
  + Triceps Pushdown: 3 sets of 12-15 reps
  + 15 minutes HIIT (30 sec work/30 sec rest)
* **Pull Day 1**:
  + Deadlift: 3 sets of 6-8 reps
  + Pull-ups or Lat Pulldown: 3 sets of 8-10 reps
  + Seated Row: 3 sets of 10-12 reps
  + Face Pulls: 3 sets of 12-15 reps
  + Biceps Curl: 3 sets of 10-12 reps
  + 15 minutes moderate cardio (70-75% max HR)
* **Legs Day**:
  + Squat: 3 sets of 8-10 reps
  + Romanian Deadlift: 3 sets of 10-12 reps
  + Walking Lunges: 3 sets of 12 reps per leg
  + Leg Extension: 3 sets of 12-15 reps
  + Leg Curl: 3 sets of 12-15 reps
  + Calf Raises: 3 sets of 15-20 reps
  + 15 minutes HIIT (30 sec work/30 sec rest)
* **Push Day 2**:
  + Overhead Press: 3 sets of 8-10 reps
  + Push-ups: 3 sets of 12-15 reps
  + Cable Chest Fly: 3 sets of 12-15 reps
  + Lateral Raises: 3 sets of 12-15 reps
  + Triceps Extension: 3 sets of 12-15 reps
  + 15 minutes moderate cardio (70-75% max HR)
* **Pull Day 2**:
  + Barbell Rows: 3 sets of 8-10 reps
  + Lat Pulldown: 3 sets of 10-12 reps
  + Single-arm Dumbbell Row: 3 sets of 10-12 reps
  + Rear Delt Fly: 3 sets of 12-15 reps
  + Hammer Curls: 3 sets of 10-12 reps
  + 15 minutes HIIT (30 sec work/30 sec rest)

📊 **Weekly Volume Guidelines**:

* Total weekly sets per muscle group: 12-15 sets
* Rest periods: 45-75 seconds between sets
* Training intensity: RPE 7-8, maintaining good form while keeping heart rate elevated

🧠 **Notes**:

* Alternating HIIT and moderate-intensity cardio optimizes fat burning while preserving muscle
* Moderate rep ranges with challenging weights promote both strength maintenance and endurance
* Circuit-style training can be implemented by moving quickly between exercises
* Caloric deficit should be moderate (15-20% below maintenance) to support recomposition
* Protein intake should remain high (1.8-2.2g/kg/day) to preserve muscle mass

📚 **Scientific Source**: Based on ACSM protocols for combined strength and aerobic activity, which demonstrated significant improvements in body composition across different training frequencies[[1]](#fn1).

**Conclusion**

These evidence-based templates provide a solid foundation for developing an AI-based personal trainer system. The workout plans are derived from authoritative sources including the ACSM and NSCA, ensuring they reflect current scientific understanding of exercise programming. For a comprehensive rule-based system, these templates should be further customized based on individual assessments, equipment availability, and specific client limitations or goals.

When implementing these templates in an AI system, consider including progression algorithms that adjust intensity, volume, and exercise selection based on user feedback and progression. Additionally, incorporate recovery monitoring and periodization principles to optimize long-term results and adherence.

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1. <https://www.fct.unesp.br/Home/Pesquisa/labsim/prescribing-physical-activity-applying-the-acsm-protocols-for-exercise-type-intensity-and-duration.pdf>

1. <https://www.barnesandnoble.com/w/nscas-guide-to-program-design-nsca-national-strength-conditioning-association/1106574762>