The solution based on a Theorem published in a book named "combinatorial optimization polyhedra and efficiency" (page111 –page112).
http://www.springer.com/mathematics/applications/book/978-3-540-44389-6

Let $D = (V, A)$ be a directed graph (with n vertices) and let $l : A \to \mathbb{R}$. The *mean length* of a directed cycle (directed closed walk) $C = (v_0, a_1, v_1, \ldots, a_t, v_t)$ with $v_t = v_0$ and $t > 0$ is $l(C)/t$. Karp [1978] gave the following polynomial-time method for finding a directed cycle of minimum mean length. For each $v \in V$ and each $k = 0, 1, 2, \ldots$, let $d_k(v)$ be the minimum length of a walk with exactly k arcs, ending at v. So for each v one has

(8.7) $$d_0(v) = 0 \text{ and } d_{k+1}(v) = \min\{d_k(u) + l(a) \mid a = (u, v) \in \delta^{\text{in}}(v)\}.$$

Now Karp [1978] showed:

Theorem 8.10. *The minimum mean length of a directed cycle in D is equal to*

(8.8) $$\min_{v \in V} \max_{0 \le k \le n-1} \frac{d_n(v) - d_k(v)}{n - k}.$$

Proof. We may assume that the minimum mean length is 0, since adding ε to the length of each arc increases both minima in the theorem by ε. So we must show that (8.8) equals 0.

First, let minimum (8.8) be attained by v. Let P_n be a walk with n arcs ending at v, of length $d_n(v)$. So P_n can be decomposed into a path P_k, say, with k arcs ending at v, and a directed cycle C with $n - k$ arcs (for some $k < n$). Hence $d_n(v) = l(P_n) = l(P_k) + l(C) \ge l(P_k) \ge d_k(v)$ and so $d_n(v) - d_k(v) \ge 0$. Therefore, (8.8) is nonnegative.

To see that it is 0, let $C = (v_0, a_1, v_1, \ldots, a_t, v_t)$ be a directed cycle of length 0. Then $\min_r d_r(v_0)$ is attained by some r with $n - t \le r < n$ (as it is attained by some $r < n$ (since each circuit has nonnegative length), and as we can add C to the shortest walk ending at v_0). Fix this r.

Let $v := v_{n-r}$, and split C into walks

(8.9) $$P := (v_0, a_1, v_1, \ldots, a_{n-r}, v_{n-r}) \text{ and}$$
$$Q := (v_{n-r}, a_{n-r+1}, v_{n-r+1}, \ldots, a_t, v_t).$$

Then $d_n(v) \le d_r(v_0) + l(P)$, and therefore for each k:

(8.10) $$d_k(v) + l(Q) \ge d_{k+(t-(n-r))}(v_0) \ge d_r(v_0) \ge d_n(v) - l(P).$$

This implies $d_n(v) - d_k(v) \le l(C) = 0$. So the minimum (8.8) is at most 0. ∎

We can find an algorithm of time complexity O(n^3).